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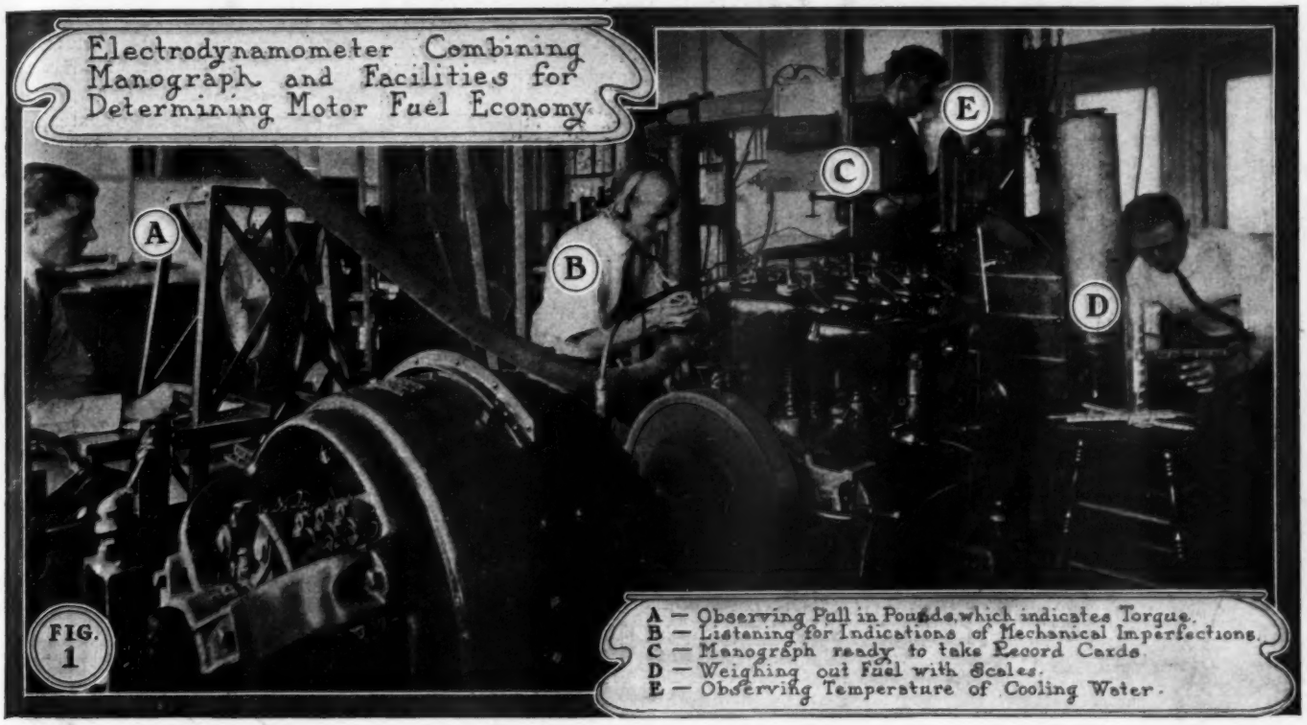
THE AUTOMOBILE

LABORATORY IN AUTOMOBILE MAKING

By Thomas J. Fay



BUFFALO, Sept. 13—In the making of the automobile of today the laboratory supplies definite methods and eliminates chances inseparable from unfit elements and other equally wasteful channels. What was once done in the making of automobiles is no longer possible or advisable. In the first cars, considerable guesswork as to material and its enduring qualities caused breakages and discouragements, both to the man who made and the man who bought.

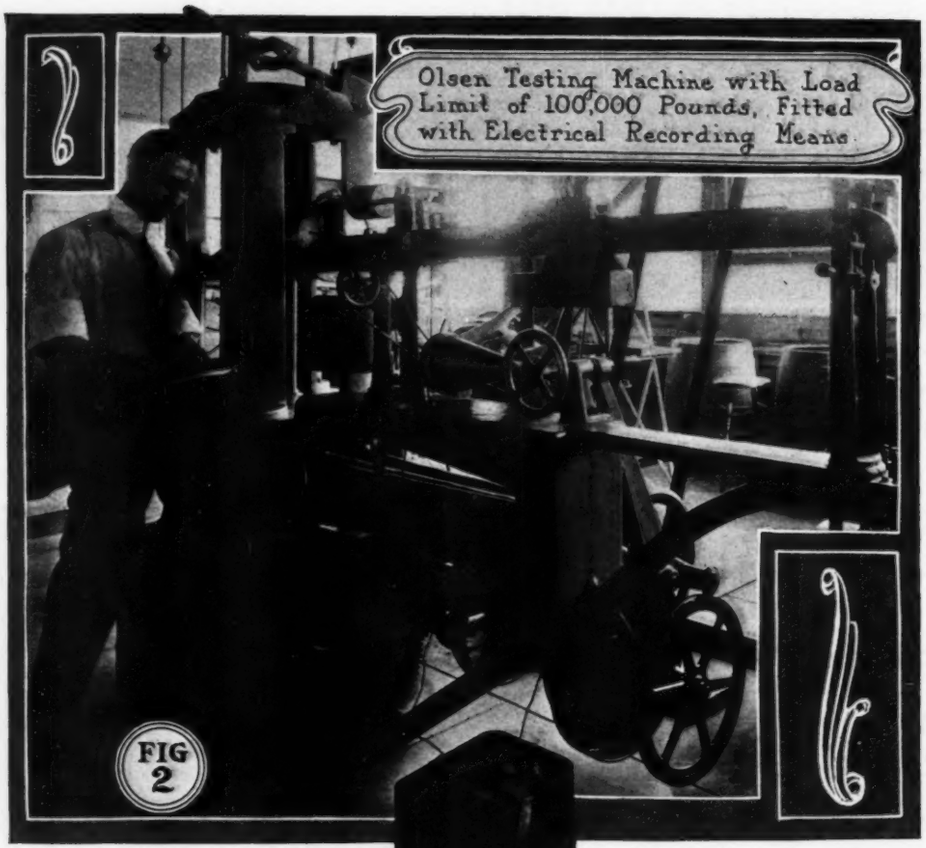
To learn that the 1910 cars have a laboratory foundation, it is only necessary to go into the establishment of a representative maker and study the up-to-date methods now employed. One there learns of laboriously-obtained engineering records calling for definite investigation of the qualities embodied before they are included in the final work of construction.

Nothing can be left to chance, no vendor's word can be safely taken for the quality of the material, and a corps of competent engineers must wait upon the men who do the work.

There is a widespread impression that the several makers of quality cars depend, for engineering information, upon one common laboratory, and that some one man is responsible for the qualities of the several grades of materials used in many makes of cars. This view of the situation merely indicates a vast lack of knowledge of the facts. Moreover, a moment's reflection is but enough to lead to the conclusion that the task is beyond a centralized laboratory, and to realize results as they must obtain in the cars about to be placed before discriminating buyers it is necessary for every big concern to have skilled men ready for instant action.

There are a vast number of reasons why each shop should have its own facilities, and the only way this phase of automobile building can be adequately explained is to investigate the situation in sufficient detail to bring out the points to be made.

Some of the Requirements in a Laboratory—The materials should be purchased on a basis of chemical composition—if they are to be heat treated, at any rate—for the reason that, in the absence of knowledge of composition, the heat-treating process will be attended with dangers, and, as is recognized, normal steel is better than heat-treated product if there is any question as to the composition. Heat treatment is necessary if the parts are to be up to the highest attainable standard. The first requirement in a laboratory is a suitable chemical equipment, by means of which every "heat" of steel or other metal, when it arrives, may be sampled at random, and the chemical composition ascertained.



Just such a laboratory equipment is depicted in Fig. 5, in which will be found all of the equipment necessary for determining alloy contents, carbon, silicon, sulphur, phosphorus, manganese, copper, arsenic, etc. In addition to these determinations, which must be made quickly, the chemist is engaged in the investigation of new products, and in trying schemes of heat treatment to bring out the qualities of the steel.

The chemist could not know, with any degree of certainty, whether or not a new mode of heat treatment would show positive advantages over a method in vogue were he not in touch with a physical laboratory in which to make and ascertain physical tests. Fig. 2 shows an Olsen testing machine used to determine the physical properties of materials, as ultimate strength, elastic limit, elongation between given limits, and reduction of area at the point of fracture. In these days, when steel for automobile parts frequently measures above 150,000 pounds per square inch tensile strength, the testing machine has to be of the greatest competence, and the test proof must be of small diameter besides. The Olsen testing machine for this work has a capacity of 100,000 pounds.

Kinetic Properties Must Be Determined—The time was when ultimate strength and certain other conventional values were ascertained, and it was thought that if a piece of steel were possessed of high attending elastic limit, elongation, and a good extension, that it would be suitable for any purpose. When automobiles came into vogue and the nature of the work was found to be of a character requiring more than static ability, kinetic life of steel was investigated at great length, and, among other facilities, the vibratory testing machine was devised. Fig. 3 shows just such a machine, built by the E. R. Thomas Motor Company for the purpose of testing all steel used, and it was naturally found that physical properties, even though they were very good, afford no guarantee of long life. After going into this phase of the material question at great length the Thomas company was enabled to eliminate all mysterious failures and reduce the factor of safety to definite values.

This testing machine rotates at a very high speed, and the materials to be tested are prepared, and, when adjusted into place in the machine, rotate under stress. The amount of stress is varied by altering the load, which is applied by means of weights, and the method of testing is such that the material may be stressed to any proportion of its elastic limit and subjected to alternate deflections, which are kept track of by means of a counter. The machine is very simple, free from errors, and it tells the vibratory value of the steel relative to a standard or in the abstract. The higher the stress in the steel undergoing test, the quicker it will fail, and the limits seem to stand between 400,000 and 1,600,000 vibrations when the steel is stressed to 65 per cent. of its elastic limit. Certainly, this is information well worth having, when account is taken of the performance of crankshafts, for illustration, in which it is impossible to assume with accuracy that a deflection is avoidable.

Bearings Demand Special Testing Equipment—When account is taken of the severe service rendered by bearings in automobiles, particularly since they are not always free from foreign substances, it is no wonder that the mind runs to ball and roller bearings, and if they are to be faithful to their work, some discrimination must be used besides relying upon catalogued information, which, in itself, may be quite accurate, but it may not properly apply. In every special case, in order to be sure of the results, it is necessary to test the ball bearings and find out if they will stand the class of service demanded of them. Fig. 4 is of a special ball-bearing testing machine built at the plant of the Thomas company to enable its engineers to cope properly with this problem, and with this machine the largest ball bearing used in any Thomas car may be tested under normal load to the end of its natural life; or it may be tested to destruction under predetermined conditions. Any type of bearing may be tested in this machine, and the loading, as well as the number of revolutions, may all be noted, either from time to time or at the end of the run.

Selections of Material for the Work—Different makers do not of necessity follow along the same lines, but there are certain market considerations which will be common to all, and in the selection of material, these influences must be taken into account. It is the function of the laboratory to tabulate the conditions, fix upon physical properties desired in view of chemical contents, and to so limit the specifications that the purchasing department will be able to procure what is wanted,

promptly, and at a price consistent with the aims. In the Thomas plant the chemist has prepared specifications for the guidance of the several departments as follows:

PHYSICAL PROPERTIES OF STEELS

STEEL (Annealed State)	Elastic Limit	Ultimate Strength	Elongation	Reduction Area
N S No. 1	60,000	80,000 90,000	30%	65%
C S " 2	27,000	50,000	25%	60%
C S " 3	33,000	60,000 66,000	23%	50%
1550° F—Quenched in oil and drawn at 600°.				
N S No. 1	135,000	200,000	15%	50%
1500° F—Quenched in brine.				
N S No. 1	170,000 180,000	230,000 240,000	11–12%	40–45%
1450° F—Quenched in oil or water.				
C S No. 2	27,000 32,000	65,000	15%	40%
C S " 3	33,000 37,000	72,000	12%	35%

Note.—For shear or torsion use values 20% less than above; for compression use values given.

STANDARD HEAT TREATMENT

This is used by them for crank shafts, connecting rods and all nickel steel that is to be machined before use. After forging—anneal at 1450° F., cool in air, heat to 1500° F. and plunge in oil, draw at lowest point at which they will machine 950° F—1050°.

Gear Treatment—For parts where it is necessary to increase strength without increasing size, the following treatment can be used for 3½% nickel steel; it is, however, rather expensive.

Pack harden at 1650° F., until carbon has penetrated a trifle over 1-64″. Cool in pot until cold, reheat to 1500° F. very slowly. Plunge in Ca C/2 or Na Cl solution, 17° B., at 125° F. Reheat rapidly with very hot fire to lowest point at which steel will be hardened, which is 1325—1350° F.

In pack hardening use 40% new and 60% old bone. Bring up to heat for three hours and soak for three hours. As a rule the interior temperature of pots is about 50% below that of furnace even after prolonged soaking. It is a good idea to add charred scrap leather to bone bin from time to time. Take scrap leather and char in furnace.

Carbon penetrates 3½% nickel steel about 1-64″ in two hours.

HEAT TREATMENT NOTES

T- 1 Transmission gears.
T- 2 Parts to be glass hard and no great strain.
T- 3 Bevel drive gears and pinions. Differential pinions.
T- 4 Small thin parts that are to be case-hardened.
T- 5 Any large work or local hardening.
T- 6 Propeller shafts and semi-floating type axle drive shaft or when bending and torsion is to be resisted.
T- 7 Same as T–8, is used only when carbon gets very high (0.28—0.32). When carbon is above these limits use T–6.
T- 8 Drive shaft of floating type axles and all places where pure torsion is to be resisted.

Ball Bearing Testing Machine which runs with Load at any speed. FIG 4

T- 9 Steering knuckles, steering arms, front and rear axles, spring chairs.
T-10 Same as T–9.
T-13 Cap screws, truss rods, Z bars. Don't use this treatment if composition of metal is not known, as it is dangerous.
T-14 Clutch drivers, steel clutch plates, etc.

Note.—Never quench semi-floating type axle drive shafts in brine.

NOTES ON MATERIAL

H. R.—Hot rolled. Steel as it comes from the rolls in the unannealed condition, runs =.005 and generally is oversized.

A.—Annealed. Hot rolled steel annealed.

C. D.—Cold drawn. Steel either cold rolled or cold drawn into bars, from 1″ to 3″. Round is correct to =.00025 less than 1″ round comes with .00025.

Drill Rod.—Comes polished or unpolished (Lime finished); the unpolished is more accurate. If it is wished to harden the outside of drill rod, manufacturer should have specifications to that effect.

Drop Forgings.—Billets for drop forgings must be clean, free from seams, pickled and cleaned in order to avoid cracks and seams. Should be annealed thoroughly before machining is begun.

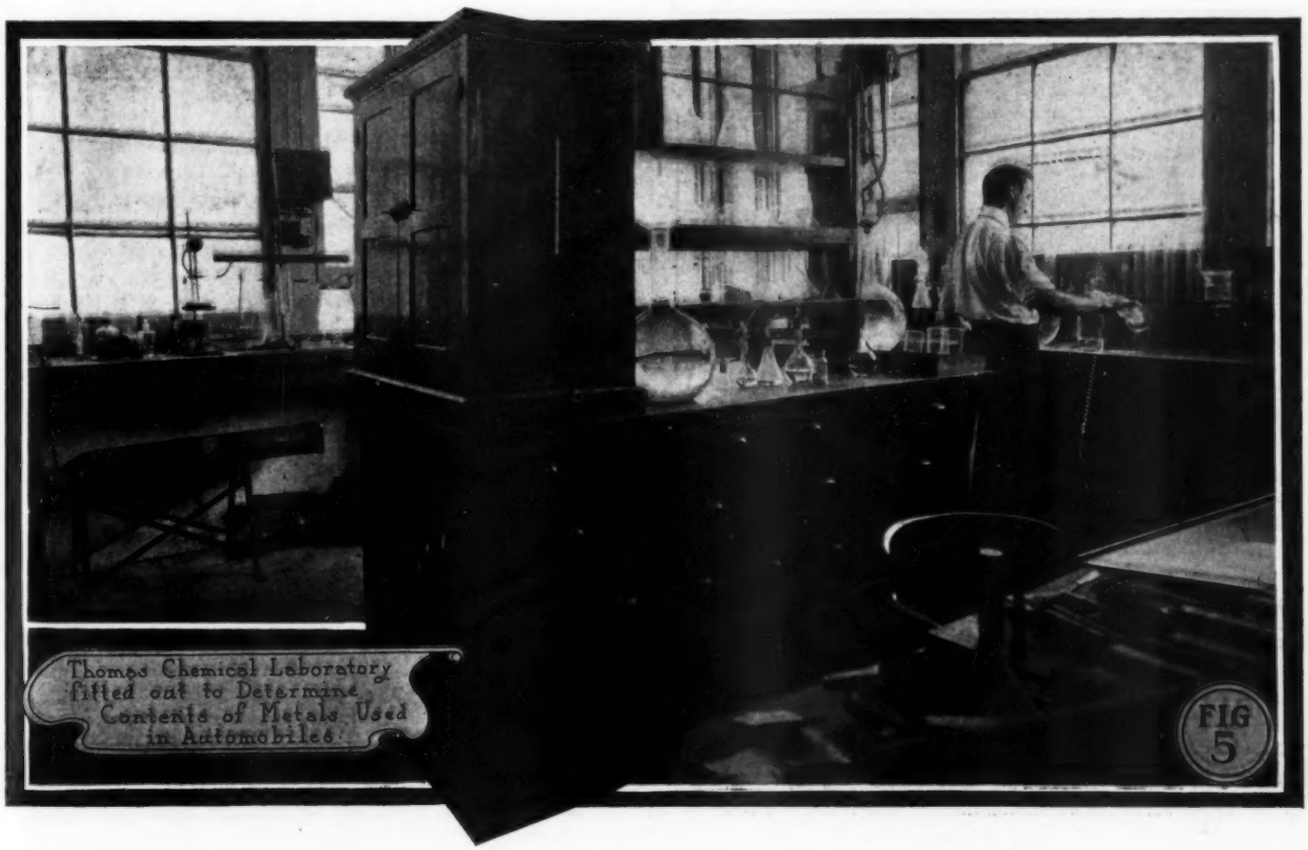
Keys.—Stock for keys should be oil or water-harden 0.80 carbon. Steel of a high grade. Harden in oil or water at 125° F.

Aluminum No. 3.—Zinc over 14% in this makes it very brittle. Heat of pouring also affects the brittleness. High zinc gives metal with very good casting qualities.

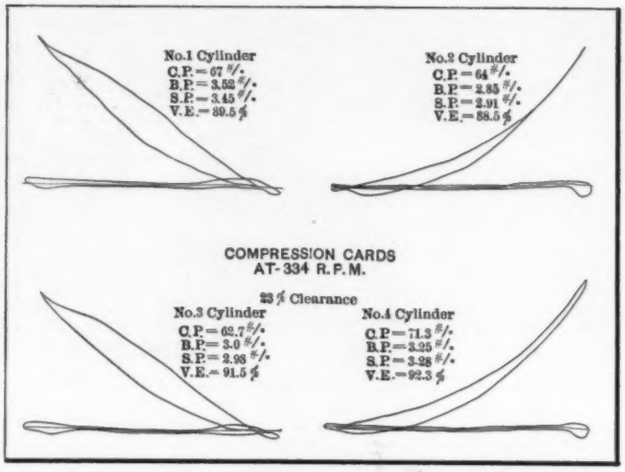
Aluminum Alloy.—Should be specified not by number but by percentage of each metal required. Then buy each metal pure and mix.

STANDARD SPECIFICATIONS—HEAT TREATMENTS

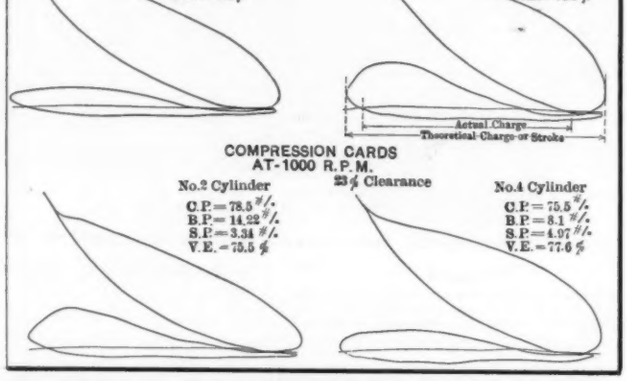
Treatments	Applies to Material	Symbols
Pack harden, allow to cool in pot, reheat to 1375° =2425° F. and quench in oil....	N S No. 1 C S No. 2....	T- 1
Pack harden, allow to cool in pot, reheat to 1375°–1425° F. and quench in water...	N S " 1 C S " 2....	T- 2



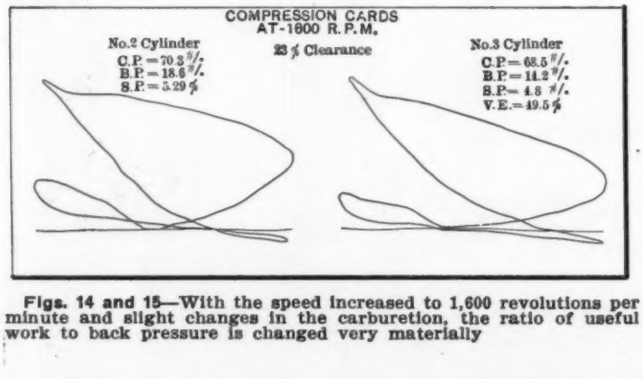
Thomas Chemical Laboratory fitted out to Determine Contents of Metals Used in Automobiles FIG 5



Figs. 6, 7, 8 and 9—Compression cards taken at the very slow speed of 334 revolutions indicate clearly the performances of the four cylinders at that speed, this varying quite a little



Figs. 10, 11, 12 and 13—At the more nearly normal speed of 1,000 revolutions the increased back pressure is equally as noticeable as is the increased power, indicated by the large end of card



Figs. 14 and 15—With the speed increased to 1,600 revolutions per minute and slight changes in the carburetion, the ratio of useful work to back pressure is changed very materially

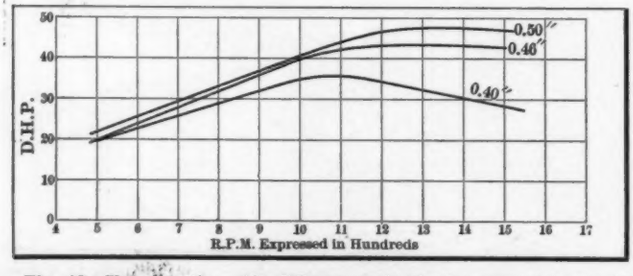


Fig. 16—Showing the wide differences in the power obtained with a proper and improper nozzle sizes in the carbureter. The shape of the upper curve shows elimination of "starvation" effects

Pack harden, allow to cool in pot, reheat to 1375°–1425° F. and quench in oil, draw at 375°–425° F.	N S	No.	1	C S No.	2	T- 3
Cyanide, quench in oil	N S	"	1	C S "	2 & 3	T- 4
Cyanide, quench in water	N S	"	1	C S "	2 " 3	T- 5
Heat to 1575°–1625° F., quench in oil	N S	"	1			T- 6
Heat to 1575°–1625° F., quench in water	N S	"	1			T- 7
Heat to 1575°–1625° F., quench in brine	N S	"	1			T- 8
Heat to 1475°–1525° F., quench in oil, draw at 475°–525° F.	N S	"	1	C S No.	3	T- 9
Heat to 1475°–1575° F., quench in oil	N S	"	1	C S "	3	T-10
All N S cap screws are to be heated to 1400°–1500° F., plunged in oil and drawn at 700°–800° F.	N S	"	1	Cap screws		T-13
Pack harden, allow to cool in pot, reheat to 1375°–1425° F., quench in brine	N S	"	1	C S No. 2		T-14
Heat to 1375°–1425° F., quench in oil at 60°–100° F., draw at 600°–650° F.	N S	"	1	Tubing after brazing		T-15
Heat to 1400°–1450° F. for 1 hour, cool in ashes or lime	N S	"	1	Electric welding		T-16
Heat to 1350°–1400° F. for 1 hour, cool in ashes or lime	C S	"	3	Electric welding		T-17

STANDARD SPECIFICATIONS—MATERIALS

N S No. 1—3½% Nickel steel.

Carbon	.18% to .28%
Sulphur	.04% or less
Phosphorus	.04% " "
Manganese	.60% to 1.00%
Nickel	3.00% " 3.75%
Copper must be less than .25%	

C S No. 2—Open hearth steel for case hardening and general use.

Carbon	.14% to .24%
Sulphur	.05% or less
Phosphorus	.05% " "
Manganese	.50% to 1.00%

C S No. 3—Open hearth steel that is not case hardened and required to be tough and stiff.

Carbon	.24% to .35%
Sulphur	.05% or less
Phosphorus	.05% " "
Manganese	.50% to 1.00%

M B No. 5—Manganese Bronze—"Parsons."

Copper	56.36%
Zinc	39.79%
Tin	.99%
Iron	.24%
Aluminum	.52%
Manganese	.40%

P B No. 7—Phosphor Bronze for bearings and general use.

Copper	88.60%
Tin	10.00%
Lead	1.00%
Phosphorus	.40%

G B No. 8—Gear Bronze.

Copper	88.00%
Tin	10.00%
Zinc	2.00%

R B No. 9—Red Brass.

Copper	80.00%
Zinc	15.00%
Tin	4.00%
Lead	1.00%

A1 No. 12—Aluminum alloy for general use.

Aluminum	92.00%
Copper	7.00%
Zinc	1.00%

STANDARD SPECIFICATIONS—DIMENSIONS, ETC.

Materials in General—Thickness x Width x Length	3-16" x 1" x 2 ½"
Bar Stock—Hex.–Sq. Rd., etc., x Length	5-8" Hex. x 1 ½"
Bearing—No. Bearing—Type	No. 204—Annular Silent
Bolt—Cap Screw—Set Screw—Diameter; Threads x Length—Head	¼"—16 x 2"
Cotter Pin—Diameter x Length	½" x 1¼"
Gasket—Inside Diameter x Outside Diameter x Thickness	½" ID x ¾" OD x 1-16"
Gear—Pitch—Teeth—Stock or Drop Forging	10 P., 30 T., 1¼" Rd. x 3"
Grease Cup—Name and Number—Pipe Threads	No. 700 Empress—⅛" pipe thread
Hose—Inside Diameter x Length	1 ½" ID x 3¼"
Nut—Diameter—Threads x Thickness	¼"—16 x 17-64"
Oiler—Name and Number—Size—Threads	No. 20, Jewel—⅛"—20
Rivet—Size x Length—Head	⅜" x 1 ½"—Rd. Hd.
Screw: Machine—Gauge—Threads x Length—Head	14—24 x ¾"—F. Hd.
Wood—Gauge x Length—Head	14 G x ¾"—F. Hd.
Spring: Elliptical—Width x Length, Center to Center of Eye	2" x 56"
Spiral—Inside Diameter or Outside Diameter x Length under given pressure	¾" OD x 1 ½" under 10"
Stud—Diameter—Threads x Length	5-16"—18 x 2"
Tubing—Outside Diameter x Wall x Length	1" OD x .065 wall x 3"
Washer: Lock—Size x Thickness	⅜" x .065
Plain—Size x Thickness	⅜" x .065
Special—Inside Diameter x Outside Diameter x Thickness	⅜" ID x ¾" OD x 1-16"
Wire—Diameter x Length	.065 Diam. x 26"

STANDARD SPECIFICATIONS—GENERAL NOTES

Cap Screws, Studs and Nuts—These are to be of C S No. 3 or A. L. A. M. standard screw stock, preferably the latter, except where N S No. 1 is specified.

Crank Shafts—In general the material specified will be N S No. 1, but the final choice of material and also its treatment is to be left to the Drop Forge people.

Tubing—Unless otherwise specified all tubing is to be cold drawn and is to be medium anneal or temper.

Gauges—Unless otherwise specified, where material is commercially gauged decimal equivalent only will be given, gauge and name of gauge being omitted.

Bar Steel—This material comes from the mills in one of three different conditions, which conditions will be specified as follows;
H R—Hot Rolled—Bar steel as it comes from the rolls in the uns annealed condition. Runs +.005 and is usually oversize.
A—Annealed—Hot rolled bar steel annealed
C D—Cold Drawn—Hot rolled bar steel annealed and cold rolled or drawn to size. 1" to 3" round, runs +.0005, less than 1" runs +.00025.

Drill Rod—Comes from mills either polished or unpolished, the latter being the more accurate.

Drop Forgings—Billets for drop forgings must be free from seams, pickled, cleaned and inspected before use. Forgings must be thoroughly annealed before machining.

Key Stock—Stock for special keys should be high grade .80% carbon steel. Hardening to be done in oil or water at 125° F.

After Material Comes the Finished Product—When the material is being worked up in the shop, it is necessary to do more than place reliance upon the supervising influence of the laboratory over the purchasing department. In the working up of the material into parts, each operation is inspected, and, if the workman makes no mistake in dimensioning, the material is given a critical examination to assure that no flaws were uncovered. This may look like too much of a good thing, but it reduces the size of the repair shop to insignificance, and enables the company is build more cars.

Upon the completion of the respective units, they have to be tested to ascertain how nearly they come to the mark set for them in the designing department, or to be able to determine what the remedy will be if the units have to be adjusted. For motor testing the electrodynamometer, as depicted in the first page illustration, is used, and, as the test progresses, the experts dispose themselves around the machine as follows:

(A) Observing the pull in pounds on the scales, which indicates the torque of the motor.

(B) With a phenendoscope strapped on the head listening for indications of mechanical imperfections, as noise or any undue interference.

(C) Manograph placed, and ready to take cards as soon as the motor is tuned up.

(D) Weighing out fuel with a set of scales on which the tank rests; taking specific gravity, as the occasion requires.

(E) Observing temperature of the water used in cooling. The amount of cooling water being measured, this enables the expert to determine the efficiency of the radiator and to tell if the motor is delivering an undue amount of heat units to the cooling water, which would be an indication of bad timing or mixture, assuming that the surface swept by flame is not in excess.

(F) The expert "B" has under observation a thermometer showing the temperature of the exhaust, and in this way a further check is held on the mixture and the timing.

The electric motor is cradled in such way that the "field" (frame) would rotate were the scales to be disconnected, and the torque of the motor is represented by the amount of the tendency of the field to rotate. The whole system is so calibrated that the horsepower can be determined for any motor tested, within the limits of the dynamometer, and the error is probably less than one percent.

The manograph cards herewith shown are offered as specimens of the work, and attention is called to the clearness with which they indicate:

(A) Compression pressure (C.P.)
(B) Back pressure (B.P.)
(C) Suction pressure (S.P.)
(D) Volumetric efficiency (V.E.)

With this class of information at hand, it is possible to investigate every cause of a loss, and, insofar as it is possible to do so, eliminate the same. The old way was to ignore back pressure, since it could be charged up to the muffler, whereas, with an equipment such as this, it is a relatively simple task to investigate the muffler and remove much of the back pressure. This is equal to adding power to the motor and reducing the weight of the power plant per horsepower; in other words, increase the weight efficiency of the power plant. The curve, Fig.

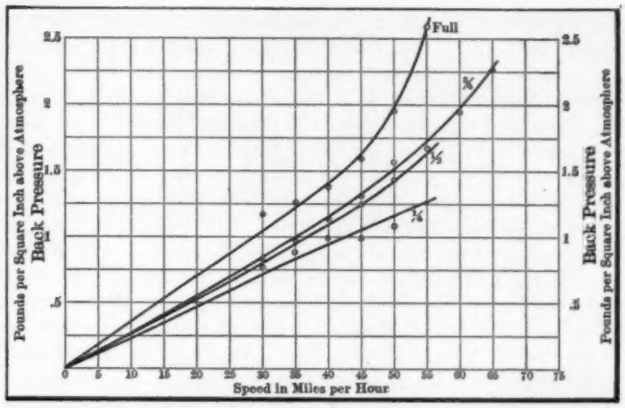


Fig. 17—Evils of back pressure are readily detected and when plotted in one specific case were seen to increase more rapidly than did the speed of the car, even when that was as high as 65 miles

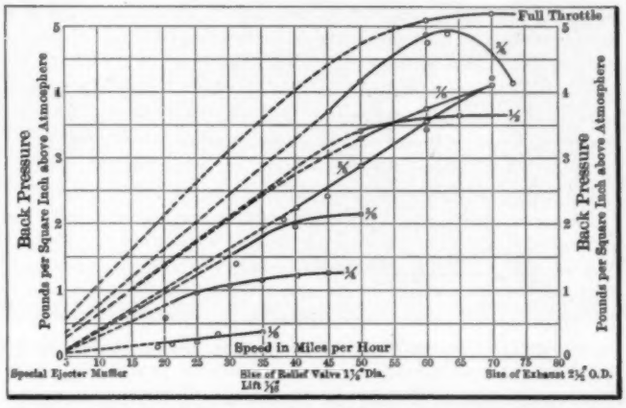


Fig. 18—Substitution of a muffler of improved and more scientific form soon eliminated the back pressure evil, at least in so far as its increase relative to the speed was concerned

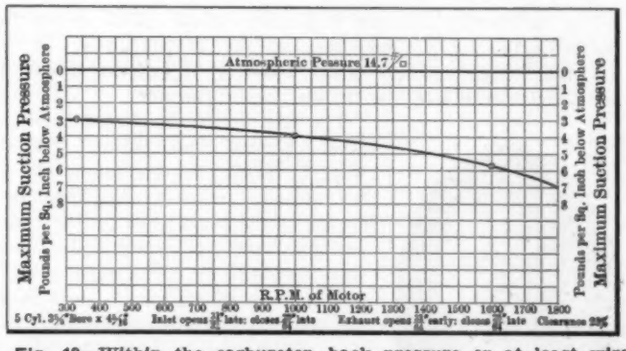


Fig. 19—Within the carbureter, back pressure or at least wire drawing made its appearance as is evidenced by the drop in the suction pressure with increased engine speed, up to 1,800 revs.

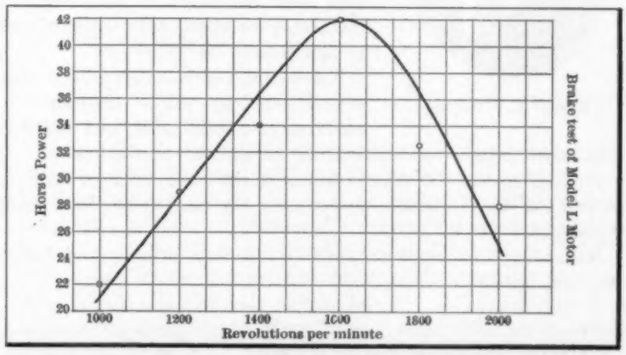


Fig. 20—Power curve of motor for which the previous indicator curves have predicted just this result, maximum power at 1,600 revolutions with a sharp rise to that point and a sharp drop beyond

20, for illustration, tells of a motor that is deficient, since the power falls off as the speed increases, after 1,600 revolutions per minute. The question is, what is the cause?

Back Pressure Due to a Defective Muffler—With a testing equipment of the character under discussion, in the hands of experts, it is possible to ascertain the cause, since the back pressure from the muffler may be determined; and Fig. 17 depicts just such a case. By inspecting the curve it will be found that the back pressure, under "full' conditions, increases more rapidly than the speed. By substituting a special form of "ejector muffler" the curve Fig. 18 resulted, in which the performance is quite different, and the power of the motor, under such conditions, would not fall off as the speed increases as a result of "piling up" of muffler pressure. The back pressure curve slopes downward at the higher range of speed, which is usually the point of greatest trouble and the one which is most difficult to cure.

Other Sources of Back Pressure Cured—It is not alone in the muffler that counter pressures will be generated; if the manifold and the piping are not ample in area, or if there are too many bends, or other eddy creating conditions, it is only by the use of proper testing equipment that there is any chance of eliminating the trouble. As an illustration of good in a rather unexpected direction, reference will be made to lowered suction pressure due to carbureter restriction, indicating excess depression. Fig. 19 shows the results of a carbureter test. In this, the suction pressure gradually increases from a minimum of three to a maximum of seven pounds per square inch, during speed changes from 300 to 1,800 revolutions per minute, thus showing a very large loss of power due solely to this cause.

Beyond back pressure, the set of curves covering practically the whole useful speed range, show as clearly as does the power curve itself the ratio of power to speed. Thus at the slowest speed of 334 revolutions, the back pressure is practically negligible; but so, too, is the power developed. With the increase in speed to 1,000, the useful end of the curve has increased, but so has the useless end, the apparent size of the two being ground for the prediction that at short speed interval further will find the turning point or peak of the power curve. This the power curve, Fig. 20, shows to be the exact state of affairs. Moreover, it shows that these cards mark to high point of the power, further increments of speed not resulting in equal increases in power. This is a condition for expert examination and preparatory to that a study of the back pressure curves, Fig. 17, will give the intelligent tester some sort of a cue to the source of trouble. The following figures show how this was remedied in one case and the immediately apparent benefits from the change.

This does not indicate that the carbureter is inferior so much as it shows that the motor demands a somewhat different set of proportions of the carbureter, and the point to be made is, that the laboratory affords a means for determining just this condition. By continuing the experiments the power obtained in the model M Thomas motor increased by gradual increment from the lowest point, which was fitted with a carburetter nozzle .040 inches in diameter, up through very noticeable increments, until the power obtained considerably exceeds the A.L.A.M. rating for a motor of this size. Fig. 16 shows the effect of changing the diameter of the nozzle alone, in a given carbureter, and the difference between the curve realized with a .040 and a .050-inch nozzle is very great indeed. The droop, which, in this instance, denoted fuel starvation, was eliminated. With the droop thus disposed of, all that remained was to correct the remaining tendencies, as excess depression, etc., and the power which ought to be available from a motor of this size was at once obtained.

In conclusion, it may not be out of place to state that the illustrations of the utility of a laboratory are but a few of the many available, and that the product of a shop can only be brought to a high state of perfection under the guidance of men who look to instruments of precision for results.

AUTOMOBILES GROW MORE LUXURIOUS

The automobile industry is a lusty infant which is nearing the strength and the buoyancy of the growing boy. Never has the present of the great industry looked as bright as now, and never has the future looked brighter.

Edwin L. Thomas

The day of the ideal automobile is here. Detail improvements will always be made, but the motor car of the present realizes the inventor's dream of the years gone by. It is dependable, and it is strong, and it is always obedient to the driver's will.

The latest efforts have been to make the motor do its work noiselessly, and to make the car as a whole smooth and quiet in operation.

Reserve power still appeals to the man with red blood in his veins, and the ability to climb hills without labor is appreciated by everyone.

Automobiles grow slightly more luxurious year by year. Cushions are made more comfortable, and the little details of design are worked out to greater perfection.

And, then, in the near future, is the vast field of business vehicle service, in which, as yet, only the taxicab has been really developed.

Regarding the entire automobile business, present and future, we are optimists.

Edwin L. Thomas

Vice-President and General Manager
E. R. Thomas Motor Co.

THE ENGINEERING LABORATORY

Engineering departments have for their aim the production of an automobile that will stand above all others in popular esteem.

In a car of quality the American public demands grace of design and beauty of finish, silence of mechanism, and abundant power. It goes without saying that the car must be durable and sturdy, and that, in detail construction, it must represent, unit by unit, the most advanced automobile design.

Henry G. McComb

To safeguard the purchaser in every possible way an engineering laboratory was established a year ago. In this laboratory possibly the most valuable work done is the dynamometer testing of engines. This testing shows, for example, which one of a number of carbureters will give the most power, the best regulation, and the highest gasoline economy. It shows, with figures that cannot lie, the difference between a correct valve-setting and an incorrect one, and a dozen other differences between right and wrong.

In a recent test it was shown that the maximum horsepower of the motor could be increased 7.7 per cent. by a change of magneto setting, and that cutting out the muffler resulted in a 16.2 per cent. increase in power.

The aim, then, of the engineering laboratory is to test dispassionately and to decide logically. The "personal element" is more nearly eliminated. The result counts.

Henry G. McComb

Chief Engineer E. R. Thomas Motor Company.

Robertson (Simplex) Finishing a Winner in the National Stock Chassis 318-Mile Race for the Lowell Trophy

LOWELL, MASS., Sept. 11—The show is over; the tent is down; and the performers have shaken Lowell's dust from their feet. The affair was extraordinarily successful, with the automobile, of course, occuying the center of the stage.

From the all-around hustling abilities of one John O. Heinze came results gratifying to Lowell's pride and remunerative to some of its citizens, for plenteous visitors attended the diversified week of sport.

The absence of President Taft was a keen disappointment, though there was some reason in his failure to occupy the special box provided for his portly frame. Recently there has been much in print not exactly favorable to automobile competition, whereupon the President of these United States may have considered the Lowell meet one which he could afford to miss.

But the sport concluded without any real serious accident, though the unfortunate fatality that inaugurated the practice trials left a feeling of apprehension which was not entirely dissipated until the big car race had come to its conclusion.

As was prophesied by those who are supposed to know, the average speed of the winner in the big car race was lower than that made Monday by the smaller cars in Class 2. Robertson in the Simplex, who took the premier position in Wednesday's race, averaged 54.2 m. p. h., while Burman's Buick averaged 55.5 m. p. h. This, however, was not all, for Lorimer's Chalmers-Detroit, driven by Lorimer, made the first seventeen laps, 180.2 miles, Monday, in 182:24, as against Robertson's 187:55 for the same distance. This was a remarkable run, considering that the faster time was made by a 40-horsepower car, while the latter was accomplished by a 60-horsepower.

Only the first two cars averaged over fifty miles an hour. The winner covered the distance of 312 miles in 352:01 2-5, while Poole and the Isotta gained second place in 373:37 1-5 minutes, 21:35 3-5 behind, at a rate of 51.1 miles per hour.

Only five cars finished, these being, besides the above two, the Fiat, driven by Parker; Buick, guided by Burman, and the Renault, handled by Basle. Two of the Knoxes, driven by Shaw and Downey, as well as the Lozier and American, driven by Cobe and Drach, respectively, were still running when the race was called off, but were three or four laps behind the leaders.

Harry Grant, driving the Alco, certainly deserved the highest praise for the wonderful performance which he put up driving the major portion of the race. From the sixth lap to the ninth he was in third place; from the tenth to the twenty-sixth in the second, scarcely five minutes behind the Simplex. In the twenty-seventh he took first place with a lead of 3:34 over the Simplex. As he had already taken on gasoline and oil, apparently he had every chance to win. However, fate was against him, for while on the backstretch he broke one of his chains. Not being permitted to carry an extra one, he was out of the race, as a new one could not be procured soon enough to insure his getting even a position. Universal regret was expressed by those who had watched his plucky and successful fight for first place.

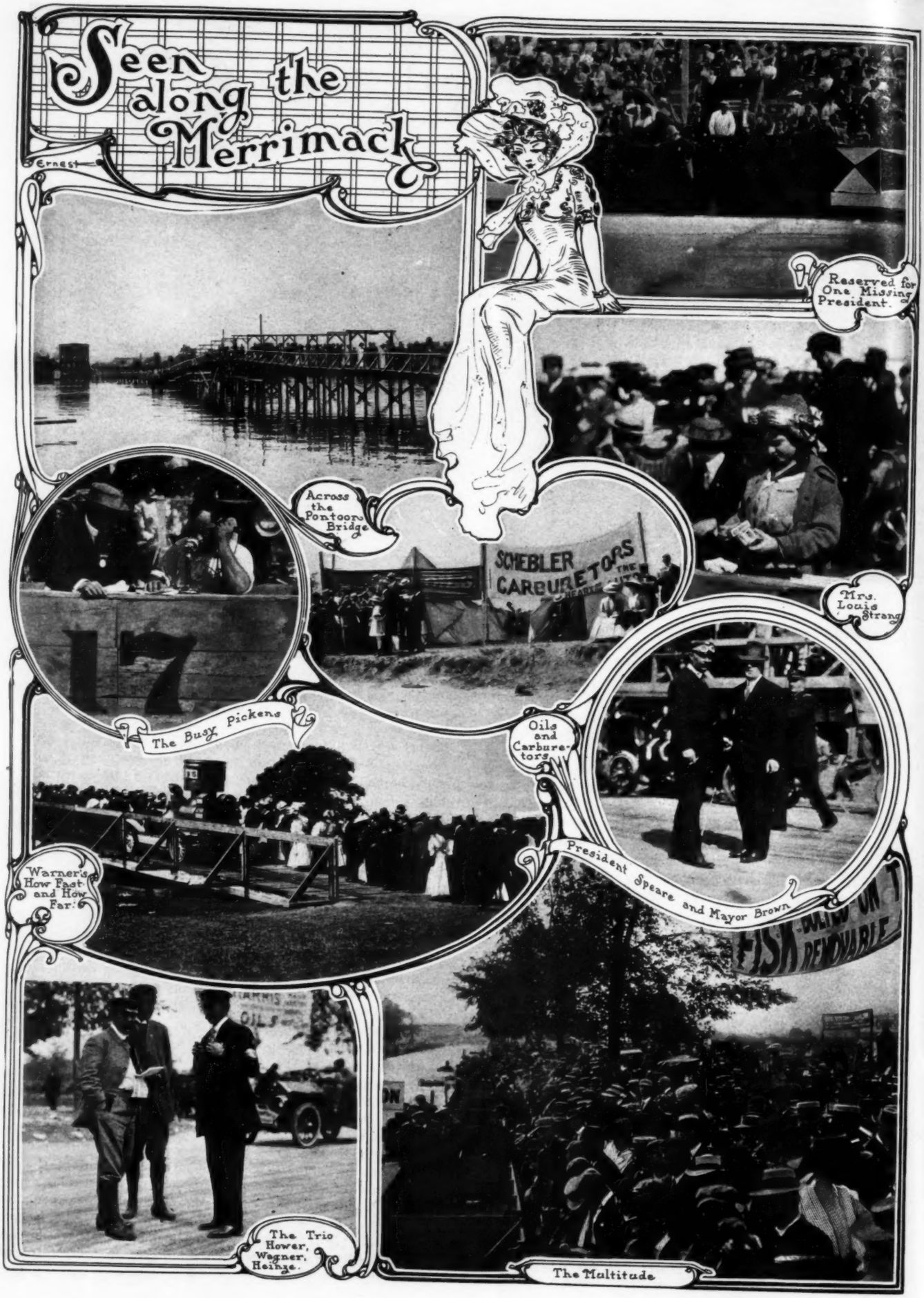
The winning Simplex was protested, Mr. Hollander of the Fiat company basing his objection to the fact that the car carried a couple of oil pipes to the back driving chains, and used two gasoline feed-pipes from the tank to the carbureter. The Simplex company, previous to the race, made affidavit that it had twenty-five cars of this model, fitted in like manner.

The protest meant that the technical trio, Beecroft, Edwards, and McMurtry, had to pay a visit to the Simplex factory in New York City. Its report is now in the hands of the contest board of the A. A. A.

Stock chassis racing, in order to make it positively such, is replete with difficulties requiring the exercise of some discretion by those entrusted with the carrying out of the rules—especially such rules as were experimentally drafted for the present season, but which will suffer considerable revision for next year.

It seems to be the general opinion that, instead of the old rule, which required only twenty-five cars of a particular model, in order to designate them as "stock," there must be a regulation which refers to a per cent. of the entire output of the factory. Otherwise a big concern without much difficulty can easily construct twenty-five cars of a semi-racing type, in order to obtain

Seen along the Merrimack



SUMMARY TOTAL AND ELAPSED TIMES OF CONTESTANTS IN NATIONAL STOCK CHASSIS RACE FOR LOWELL CUP, LOWELL, MASS., SEPT., 8, 1909

No.	Car and Driver	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
12	Simplex Robertson	10:53 10:53	21:32 10:29	32:14 10:42	42:58 10:44	53:34 10:36	64 30 10:56	75 33 10:50	86 35 11:02	97 35 11:00	108:36 11:01	119:38 11:02	130:56 11:18	142:10 11:14	153:26 11:16	164:51 11:25	176:19 11:28	187:55 11:36	199:36 11:41	211:15 11:39	223:09 11:44	241:18 18:09	252:33 11:15	264:02 11:29	275:25 11:22	286:37 11:12	297:58 11:21	313:22 15:24	324:48 11:26	340:09 15:21	352:01 11:52
6	Isotta Poole	11:47 11:47	23:20 11:33	34:44 11:24	45:56 11:12	56:50 10:54	67:44 10:54	78:55 11:11	90:99 11:14	101:26 11:17	113:11 11:45	124:19 11:08	136:02 11:43	149:14 13:12	171:57 22:43	184:56 12:59	197:00 12:04	209:13 12:13	221:13 12:00	233:09 11:5(	244:40 11:31	256:32 11:52	268:12 11:40	284:05 13:53	296:03 11:58	308:07 12:05	325:08 17:01	337:25 12:17	349:34 12:09	361:44 12:10	373:37 11:53
7	Fiat Parker	11:33 11:33	23:04 11:2(	34:25 11:21	45:38 11:13	56:52 11:14	68:03 12 11	79:18 11:15	90:29 11:11	101:42 11:13	112:58 11:1(	124:22 11:24	135:46 11:24	175:5(40:10	187:47 11:51	199:39 11:52	211:41 12:02	223:45 12:04	235:50 12:05	249:51 14:01	262:05 12:14	274:13 12:08	286:18 11:05	298:85 12:07	310:31 12:0(	322:32 12:01	334:33 12:01	346:30 11:57	358:09 11:39	368:29 10:20	382:21 13:52
4	Buick Burman	11:05 11:05	21:55 10:50	32:38 10:43	43:38 11:00	54:34 10:56	72:38 18:04	85:38 13:00	99:58 14:20	119:46 19:48	137:10 17:23	148:11 11:01	159:24 11:13	170:34 11:10	181:44 11:10	192:49 11:05	203:55 11:06	215:16 12:05	227:38 12:22	238:58 11:20	250:32 11:34	262:02 11:30	273:25 11:23	284:39 11:14	305:50 21:11	317:21 11:31	330:22 13:01	351:08 20:46	362:44 11:36	374:12 11:28	385:44 11:32
20	Renault Basle	12:03 12:03	23:57 11:54	35:57 12:00	47:55 11:58	59:52 11:57	71:52 12:00	83:46 11:22	100:02 16:16	113:38 13:31	125:33 12:00	141:31 15:58	155:22 13:51	170:08 14:46	182:20 12:12	194:33 12:13	210:16 15:43	224:03 13:47	236:14 12:11	248:2(12:12	260:38 12:12	279:01 18:23	292:52 13:51	305:2(12:34	322:08 16:44	335:42 13:34	348:00 12:18	360:17 12:17	372:32 12:13	384:43 12:11	396:47 12:04
11	Fiat De Palma	11:01 11:01	22:1(11:15	33:18 11:02	48:29 15:11	61:39 13:10	72:51 11:12	83:50 10:59	94:42 10:28	107:23 12:41	118:48 11:25	131:15 12:37	142:18 11:03	153:00 10:42	164:28 11:28	175:45 11:17	186:40 10:55	197:35 10:35	208:46 11:11	219:51 11:05	231:11 11:20	244:27 13:1(	255:43 11:16	266:5(11:1(	283:27 16:28	296:18 12:5(	307:28 11:10	318:45 11:17	332:13 13:28	354:26 22:13	Engine trouble
10	Knox Shaw	12:34 12:34	24:18 11:34	36:15 11:57	47:01 10:46	58:47 11:46	80:23 21:3(	92:02 11:39	103:46 11:44	115:17 11:31	139:12 23:55	158:09 18:57	171:51 13:42	184:23 12:32	196:51 12:28	209:10 12:19	227:50 18:40	240:33 12:43	253:09 12:26	265:30 12:21	277:5(12:29	290:45 12:56	308:54 17:09	317:02 13:0(	342:47 25:45	355:10 12:33	368:12 12:52	381:17 13:05	395:50 14:33	Running at finish	
5	Alco Grant	10:53 10:53	22:0(11:13	32:56 10:50	43:49 10:43	54:47 10:58	65:46 11:59	76:42 10:56	87:38 10:5(	98:40 11:02	109:48 11:08	122:45 11:57	133:49 11:04	144:59 11:10	158:01 13:02	171:24 13:23	182:47 11:23	194:01 11:14	205:20 11:19	219:48 14:28	231:01 11:13	242:19 11:18	253:28 11:09	264:54 11:2(	276:12 11:18	287:32 11:20	298:45 11:13	309:58 11:13	Broke Driving Chain		
14	Knox Downey	12:23 12:23	24:3(12:13	37:13 12:37	53:50 14:37	76:52 23:02	94:51 17:59	109:04 14:13	127:41 18:37	139:33 11:52	156:20 16:47	190:01 33:41	202:06 12:05	214:43 12:37	227:05 12:22	239:38 12:33	252:22 12:44	265:01 12:39	277:37 12:36	290:09 12:32	303:18 13:09	326:21 23:03	338:00 11:39	349:53 11:53	361:55 12:02	374:24 12:29	387:05 12:41	400:02 12:59	Running at finish		
18	Lozier Cobe	11:3(11:36	23:13 12:23	35:04 11:51	46:47 11:43	58:40 11:53	70:42 11:52	110:27 39:45	125:42 14:15	149:10 23:28	174:48 25:38	187:41 12:53	200:56 13:15	213:53 12:57	227:47 13:54	247:38 19:51	260:37 12:59	273:25 12:48	286:04 12:39	298:43 12:39	311:21 12:38	324:16 12:38	338:45 14:29	351:01 12:1(	367:35 16:34	379:52 12:17	392:1(12:24	Running at finisn			
2	American Drach	10:47 10:47	56:44 45:57	68:57 12:13	81:21 12:24	93:29 12:08	105:38 12:09	118:03 12:25	130:25 12:22	142:42 12:17	154:45 12:03	168:33 12:48	180:43 12:10	193:52 13:09	215:09 11:17	227:38 12:29	241:09 13:21	253:48 12:39	267:50 14:02	291:44 13:54	316:21 24:38	332:34 16:13	345:42 13:08	356:0(10:24	373:42 17:36	387:25 13:43	407:5(20:31	Running at finish			
11	Fiat	6	6	5	12	12	10	8	7	7	7	5	5	4	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	2	2 Out
5	Alco	3	5	4	4	4	3	3	3	3	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	1	Out	
3	Allen-Kingston	11	9	9	13	13	11	10	8	13	13	10	10	10	10	10	10	11	11	Out											
1	Buick	17	17	17	16	16	16	15	15	15	15	13	13	13	Out																
16	Apperson	5	3	2	2	2	2	2	1	1	3	Out																			
15	Stoddard-Dayton	14	14	12	10	10	6	6	6	6	6	Out																			
8	Knox	8	7	6	5	12	Out																								
17	Buick	1	1	11	Out																										

No.	Car and Driver				
12	Simplex	10:53	21:32	32:14	42:58
	Robertson	10:53	10:29	10:42	10:44
6	Isotta	11:47	23:20	34:44	45:56
	Poole	11:47	11:33	11:24	11:12
7	Fiat	11:33	23:04	34:25	45:38
	Parker	11:33	11:2(	11:21	11:13
4	Buick	11:05	21:55	32:38	43:38
	Burman	11:05	10:50	10:43	11:00
20	Renault	12:03	23:57	35:57	47:55
	Basle	12:03	11:54	12:00	11:58
11	Fiat	11:01	22:1(	33:18	48:29
	De Palma	11:01	11:15	11:02	15:11
10	Knox	12:34	24:18	36:15	47:01
	Shaw	12:34	11:34	11:57	10:46
5	Alco	10:53	22:0(	32:56	43:49
	Grant	10:53	11:13	10:50	10:43
14	Knox	12:23	24:3(	37:13	53:50
	Downey	12:23	12:13	12:37	14:37
18	Lozier	11:3(	23:13	35:04	46:47
	Cobe	11:36	12:23	11:51	11:43
2	American	10:47	56:44	68:57	81:21
	Drach	10:47	45:57	12:13	12:24
3	A-K	11:39	23:10	35:13	49:44
	Hughes	11:39	11:31	12:03	14:31
1	Buick	56:23	69:33	80:51	92:01
	Strang	56:23	13:10	11:10	11:16
16	Apperson	10:57	21:50	32:31	43:12
	Lytle	10:57	10:33	10:41	10:41
15	Stoddard	12:15	24:22	36:00	47:29
	Shaw	12:15	12:09	11:38	11:29
8	Knox	11:30	22:41	33:58	45:16
	Belcher	11:30	11:11	11:17	11:08
17	Buick	10:41	21:14	35:17	Broken Frame.
	Chevrolet	10:41	10:33	14:04	

No.	Car and Driver								
12	Simplex	53:34	64 30	75 33	86 35	97 35	108:36	119:38	130:56
	Robertson	10:36	10:56	10:50	11:02	11:00	11:01	11:02	11:18
6	Isotta	56:50	67:44	78:55	90:99	101:26	113:11	124:19	136:02
	Poole	10:54	10:54	11:11	11:14	11:17	11:45	11:08	11:43
7	Fiat	56:52	68:03	79:18	90:29	101:42	112:58	124:22	135:46
	Parker	11:14	12 11	11:15	11:11	11:13	11:1(	11:24	11:24
4	Buick	54:34	72:38	85:38	99:58	119:46	137:10	148:11	159:24
	Burman	10:56	18:04	13:00	14:20	19:48	17:23	11:01	11:13
20	Renault	59:52	71:52	83:46	100:02	113:38	125:33	141:31	155:22
	Basle	11:57	12:00	11:22	16:16	13:31	12:00	15:58	13:51
11	Fiat	61:39	72:51	83:50	94:42	107:23	118:48	131:15	142:18
	De Palma	13:10	11:12	10:59	10:28	12:41	11:25	12:37	11:03
10	Knox	58:47	80:23	92:02	103:46	115:17	139:12	158:09	171:51
	Shaw	11:46	21:3(	11:39	11:44	11:31	23:55	18:57	13:42
5	Alco	54:47	65:46	76:42	87:38	98:40	109:48	122:45	133:49
	Grant	10:58	11:59	10:56	10:5(	11:02	11:08	11:57	11:04
14	Knox	76:52	94:51	109:04	127:41	139:33	156:20	190:01	202:06
	Downey	23:02	17:59	14:13	18:37	11:52	16:47	33:41	12:05
18	Lozier	58:40	70:42	110:27	125:42	149:10	174:48	187:41	200:56
	Cobe	11:53	11:52	39:45	14:15	23:28	25:38	12:53	13:15
2	American	93:29	105:38	118:03	130:25	142:42	154:45	168:33	180:43
	Drach	12:08	12:09	12:25	12:22	12:17	12:03	12:48	12:10
3	A-K	61:46	74:04	85:46	97:42	143:35	172:37	185:09	197:25
	Hughes	12:02	12:18	11:42	11:5(	45:53	29:02	12:22	12:16
1	Buick	103:17	114:36	127:50	139:02	150:20	162:17	196:16	207:35
	Strang	11:16	11:19	13:14	11:12	11:18	11:57	33:54	11:19
16	Apperson	53:56	64:44	75:41	86:26	97:06	110:26	Broke Camshaft	
	Lytle	10:44	10:22	10:57	10:45	10:39	13:21		
15	Stoddard	58:57	70:32	81:55	93:20	104:52	116:30	Broke Steering Knuckle	
	Shaw	11:28	11:35	11:23	11:45	11:32	11:38		
8	Knox	56:49	75:45	Broke Steering Knuckle.					
	Belcher	11:33	18:5(						
17	Buick								
	Chevrolet								

No.	Car and Driver								
12	Simplex	142:10	153:26	164:51	176:19	187:55	199:36	211:15	223:09
	Robertson	11:14	11:16	11:25	11:28	11:36	11:41	11:39	11:44
6	Isotta	149:14	171:57	184:56	197:00	209:13	221:13	233:09	244:40
	Poole	13:12	22:43	12:59	12:04	12:13	12:00	11:5(	11:31
7	Fiat	175:5(	187:47	199:39	211:41	223:45	235:50	249:51	262:05
	Parker	40:10	11:51	11:52	12:02	12:04	12:05	14:01	12:14
4	Buick	170:34	181:44	192:49	203:55	215:16	227:38	238:58	250:32
	Burman	11:10	11:10	11:05	11:06	12:05	12:22	11:20	11:34
20	Renault	170:08	182:20	194:33	210:16	224:03	236:14	248:2(	260:38
	Basle	14:46	12:12	12:13	15:43	13:47	12:11	12:12	12:12
11	Fiat	153:00	164:28	175:45	186:40	197:35	208:46	219:51	231:11
	De Palma	10:42	11:28	11:17	10:55	10:35	11:11	11:05	11:20
10	Knox	144:59	158:01	171:24	182:47	194:01	205:20	219:48	231:01
	Shaw	11:10	13:02	13:23	11:23	11:14	11:19	14:28	11:13
5	Alco	214:43	227:05	239:38	252:22	265:01	277:37	290:09	303:18
	Grant	12:37	12:22	12:33	12:44	12:39	12:36	12:32	13:09
14	Knox	213:53	227:47	247:38	260:37	273:25	286:04	298:43	311:21
	Downey	12:57	13:54	19:51	12:59	12:48	12:39	12:39	12:38
18	Lozier	193:52	215:09	227:38	241:09	253:48	267:50	291:44	316:21
	Cobe	13:09	11:17	12:29	13:21	12:39	14:02	13:54	24:38
2	American	209:50	222:10	234:22	246:34	265:13	Injured rear axle		
	Drach	12:25	12:20	12:12	12:12	12:39			
3	A-K	207:35	247:03	Radiator troubles caused by colliding before race.					
	Hughes	11:19	31:28						
1	Buick								
	Strang								
16	Apperson								
	Lytle								
15	Stoddard								
	Shaw								
8	Knox								
	Belcher								
17	Buick								
	Chevrolet								

No.	Car and Driver								
12	Simplex	324:48	340:09	352:01					
	Robertson	11:26	15:21	11:52					
6	Isotta	358:09	368:29	382:21					
	Poole	11:39	10:20	13:52					
7	Fiat	362:44	374:12	385:44					
	Parker	11:36	11:28	11:32					
4	Buick	372:32	384:43	396:47					
	Burman	12:13	12:11	12:04					
20	Renault	332:13	354:26	Engine trouble					
	Basle	13:28	22:13						
11	Fiat	395:50	Running at finish						
	De Palma	14:33							
10	Knox	309:58	Broke Driving Chain						
	Shaw	11:13							
5	Alco	400:02	Running at finish						
	Grant	12:59							
14	Knox	392:1(	Running at finisn						
	Downey	12:24							
18	Lozier	Running at finish							
	Cobe								
2	American								
	Drach								
11	Fiat								
5	Alco								
3	Allen-Kingston								
1	Buick								
16	Apperson								
15	Stoddard-Dayton								
8	Knox								
17	Buick								

AVERAGE SPEEDS OF CARS AT LOWELL

CLASS 1—LOWELL TROPHY

12	Simplex	Robertson	54.2 m.p.h.
6	Isotta	Poole	51.1 m.p.h.
7	Fiat	Parker	49.8 m.p.h.
4	Buick	Burman	19.5 m.p.h.
20	Renault	Basle	48.1 m.p.h.

CLASS 2—VESPER TROPHY

J.	Buick	Burman	55.5 m.p.h.
E.	Benz	Stoecker	52.5 m.p.h.
H.	Chalmers	Dingley	52.2 m.p.h.
A.	Chalmers (for 180 miles)		59.5 m.p.h.

CLASS 3—YORICK TROPHY

31	Buick	Chevrolet	54.2 m.p.h.
33	Buick	Harroun	48.8 m.p.h.

CLASS 4—MERRIMACK TROPHY

42	Chalmers	Knipper	51.5 m.p.h.
44	Maxwell	See	47.7 m.p.h.
45	Maxwell	Costello	46.5 m.p.h.

POSITIONS OF CARS ON EACH LAP OF LOWELL RACE

No.	Car	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
12	Simplex	4	2	1	1	1	1	1	2	2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2	1	1	1
6	Isotta	12	11	8	7	6	4	4	4	4	5	3	4	3	4	4	4	4	4	4	4	4	4	4	4	4	4	3	3	2	
7	Fiat	9	8	7	6	7	5	5	5	5	4	4	3	7	7	7	6	6	7	7	5	5	5	5	5	5	5	4	4	3	
4	Buick	7	4	3	3	3	9	9	9	10	9	7	7	5	5	5	5	5	5	5	6	6	6	6	6	6	6	5	4	4	
20	Renault	13	12	12	11	11	8	7	10	8	8	6	6	6	6	6	7	7	6	6	6	7	7	7	7	7	7	6	5		
10	Knox	16	13	14	9	9	13	11	11	9	10	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	7	Running		
14	Knox	15	15	15	14	14	14	12	13	11	12	12	12	12	11	11	10	10	9	9	9	9	9	9	9	9	9	Running			
18	Lozier	10	10	10	8	8	7	13	12	14	14	11	11	11	12	12	12	12	11	11	10	10	10	10	10	10	10	Running			
2	American	2	16	16	15	15	15	14	14	12	11	9	9	9	9	9	9	9	10	10	11	11	11	11	11	11	11	Running			
11	Fiat	6	6	5	12	12	10	8	7	7	7	5	5	4	3	3	3	3	3	3	3	3	3	3	3	3	3	3	2	2 Out	
5	Alco	3	5	4	4	4	3	3	3	3	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	1	Out	
3	Allen-Kingston	11	9	9	13	13	11	10	8	13	13	10	10	10	10	10	10	11	11	Out											
1	Buick	17	17	17	16	16	16	15	15	15	15	13	13	13	Out																
16	Apperson	5	3	2	2	2	2	2	1	1	3	Out																			
15	Stoddard-Dayton	14	14	12	10	10	6	6	6	6	6	Out																			
8	Knox	8	7	6	5	12	Out																								
17	Buick	1	1	11	Out																										

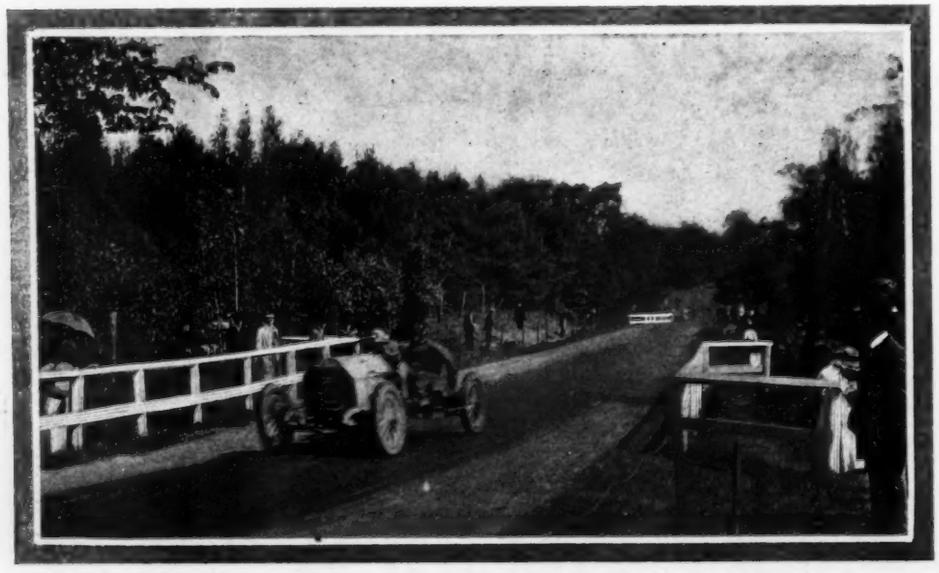
Poole (Isotta) Negotiating "Dip" Which Was Considered Difficult

cars, which, in all fairness, do not belong in the stock category, and which would not be sold to the general public as such.

In the matter of drivers it is a fact that those manufacturers who entrust their racing craft to somewhat inexperienced men from the testing department do not figure very often in the list of winners. A man may be a most capable tester and still lack the essentials which go to make up a skilful racing driver. And skill only comes with practice; but the human material in the first instance must be of the sort which takes to competition as naturally as a duck does to water. Drivers are more frequently born than made, and many makers are discovering such to be the case.

Then, again, there is the driver who, having won a victory or two under most favorable conditions, begins to think himself the peer of all others. It does not take long to burst his bubble reputation, and he soon falls back among the "also rans."

Lowell is quite well satisfied with its automobile racing, and even now it hankers for something of the big sort again next year. The Lowell Automobile Club intends to seek something of a national character in 1910, and with Heinze at the helm the chances are not rated below par. This man obtained a special legislative act to permit automobile racing in Massachusetts.

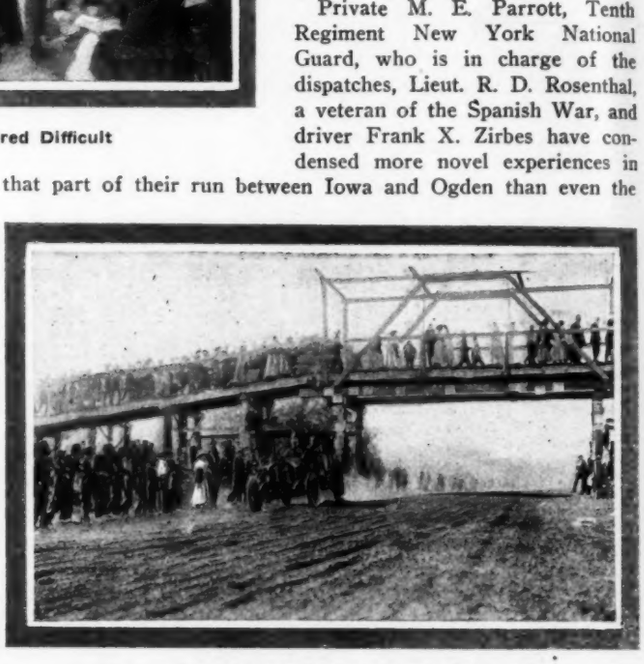


Grant (Alco) in Full Flight Over a Perfect Stretch of Roadway

RANGERS' PROGRESS

OGDEN, UTAH, Sept. 13—This city was reached last Sunday night by the military trio carrying dispatches from Major-General Leonard Wood, of New York, to Major-General John F. Weston, of San Francisco, in the Mitchell Ranger. The party experienced road conditions which would be considered impossible in any civilized country, and they were frequently forced to obtain the permission of the Union Pacific authorities to use the railroad bridges, as all others had been swept away by washouts and swollen rivers.

Private M. E. Parrott, Tenth Regiment New York National Guard, who is in charge of the dispatches, Lieut. R. D. Rosenthal, a veteran of the Spanish War, and driver Frank X. Zirbes have condensed more novel experiences in that part of their run between Iowa and Ogden than even the New York-Paris racers encountered. All are in good health, and after rounding the corner of the Great Salt Lake look for a speedy and uneventful dash across the desert land of Nevada to Reno. From the latter place the route lies through Truckee and Colfax, and thence by a speedy schedule through Sacramento to Oakland. The goal of the first across-the-country automobile war dispatch expedition will be the Presidio, San Francisco.

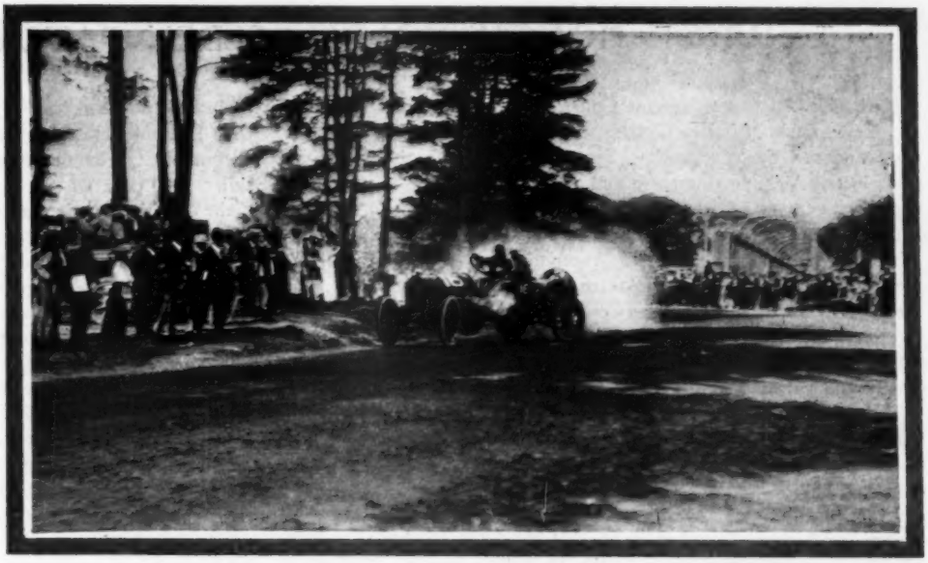


Knox Passing Over Disintegrated Backstretch

When asked after the race what he thought of the course, Robertson's reply was surprising, for the Merrimack Valley course was supposed to be ideal. "The Varnum avenue side was in good shape," said the driver, "but the backstretch was the hardest, roughest race course that I have ever driven on. Prior to the light car race it was fairly smooth, but the big cars tore up the road frightfully, and it was rough going."

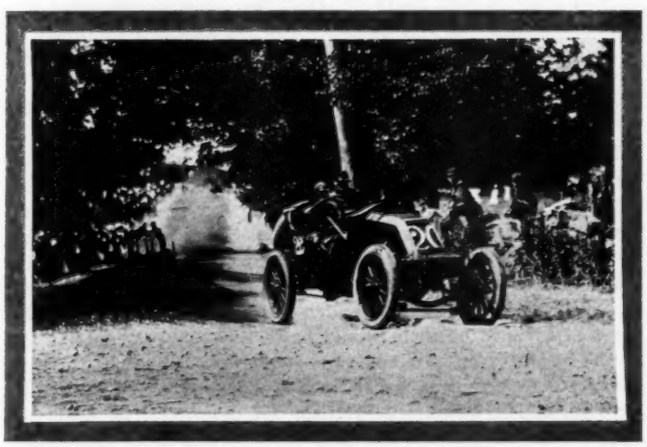
GOOD ROADS TALKFEST

CLEVELAND, Sept. 15—The vanguard of delegates and officers of the American Automobile Association are reaching Cleveland to complete arrangements for the Second Annual National Good Roads Convention which will open in this city next Tuesday afternoon. Chairman George C. Diehl of the National Convention committee and Secretary Frederick H. Elliott are already here. The official headquarters of the committee, representing the A. A. A., the National Grange, U. S. Office of Public Roads, the American Road Makers' Association, and the different automobile associations and other bodies assisting in the convention, will be at the Cleveland Automobile Club, where the guests, highway officials, and delegates may be assured of a hearty welcome upon their arrival.



Herb Lytle's Apperson Which Made a Meteoric Run in the Race

As a pleasant change from the practical and more serious elements of the Good Roads Convention the entertainment committee, whose members are chiefly drawn from the Cleveland Automobile Club, has made ample preparations for the social enjoyment of the delegates and guests who will be in the city during the convention days, Sept. 21 to 23. The steamer *City of Detroit* has been chartered for the use of the delegates and a special trip will be announced for one of the afternoons. Thursday evening a theatrical performance has been arranged which will be conducted by the members of the Hermit Club.



Basle (Renault) Took the Turns Very Comfortably

While the Governors of practically every State in the Union have made favorable replies to the requests that delegates be named to represent their States at the convention, no letter has exceeded in its expressions of appreciation of the good roads movement that of Governor Joseph M. Brown of Georgia. No less than fifty-four delegates have been named by Governor Brown to represent his State. Governor Brown in his letter to the officers of the A. A. A. naming the delegates says: "The improvement of the public highways being the demand of progress and necessary to that commercial and civic intercourse which makes for a quickening of patriotic endeavor, conventions that are called for the purpose of such advancement should receive executive approval."

Among the delegates, many of whom will be recognized as acknowledged good roads advocates, are: Congressman Clark Howell; Frank C. Battey, president of the Savannah Automobile Club; Asa G. Candler, president of the Atlanta Automobile Association; Prof. C. Strahan, Hon. W. F. Holdman, Hon. F. L. Seely, Hon. Wiley Williams, Gen. Clifford L. Anderson, and E. H. Inman.

OHIO FARMERS SEE HOW TO MAKE ROADS

COLUMBUS, O., Sept. 13—The cause of good roads in this section of the State was given a lasting impetus by the practical demonstrations and discussions at the good roads day, held in conjunction with the State fair lately. Hundreds of automobilists and farmers participated in the exercises. One of the features was the construction of two stretches of road to illustrate the proper methods of up-to-date highway building.

American (Drach) Which Was Up and Doing When Race Concluded

JUDGE HOUGH HOLDS SELDEN PATENT IS VALID

IN the United States Circuit Court of the Southern District of New York, Justice Charles M. Hough presiding, decision was rendered on Wednesday, Sept. 15, sustaining the plaintiffs, the Electric Vehicle Company and George B. Selden, in their suit for infringement of patent claims against the Ford Motor Company, C. A. Duerr & Company, the O. J. Gude Company, John Wanamaker, et al, the Société Anonyme des Anciens Etablissements Panhard & Levassor, Andre Massenet, and Henry and A. C. Neubauer. In its decision the Court holds that the Ford machine infringes the Selden patent claims one, two, and five of the plaintiffs, and that the Panhard infringes claims one and five. The concluding paragraphs of Judge Hough's decision are as follows:

"No litigation closely resembling these cases has been shown to the Court and no instance is known to me of an idea being buried in the Patent Office until the world caught up to and passed it, and then embodied in a patent only useful for tribute. But patents are granted for inventions. The inventor may use his discovery, or he may not, but no one else can use it for 17 years. That 17 years begins whenever the United States so decrees by its patent grant. That the applicant for patent rights acquiesces in delay, or even desires delay, is immaterial to the courts so long as the statute law is not violated. On these principles complainants are entitled to a decree."

Claim No. 1, regarded as the most important, on which the court holds both the Ford and Panhard machines have infringed, is as follows: "The combination with a road-locomotive, provided with suitable running gear including a propelling wheel and steering mechanism, of a liquid hydrocarbon gas engine of the compression type, comprising one or more power cylinders, a suitable liquid fuel receptacle, a power shaft connected with and arranged to run faster than the propelling wheel, an intermediate clutch or disconnecting device and a suitable carriage body adapted to the conveyance of persons or goods, substantially as described."

Claim No. 2, of which it is held that the Ford machine only is an infringement, varies from No. 1 only in requiring the "suitable carriage body" to be "located above the engine." The fifth claim which is held to be infringed by both the Ford and Panhard sets forth substantially the same combination, but describes specifically the engine as comprising a plurality of cylinders with pistons arranged to act in succession during the rotation of the power shaft."

The complainant alleged that all three of the claims enumerated were infringed by all the defendants. "This statement of complainants' position," says Judge Hough, "seems sufficient to show that the subject matter of these suits is the modern gasolene automobile. The defendants are severally the manufacturers, seller and user of the Ford machine (a well-known American make) and the maker and importer of the Panhard, a celebrated and typical French product. If these defendants infringe, it is because complainants own a patent so fundamental and far-reaching as to cover every modern car driven by any form of petroleum vapor, and as yet commercially successful."

After entering into a detailed discussion relative to the mechanical issues at stake, Judge Hough says: "If I have correctly apprehended it, there was clearly room for a pioneer patent, and it must now be held that on its face and in view of the art Selden's is such a patent. This means that Selden is entitled to a broad range of equivalents, and this rule as applied here results in this crucial inquiry: was Selden (or anyone else) entitled in 1879 to appropriate as one of the elements of any patentable combination a 'liquid hydrocarbon gas engine of the compression type'?"

The cases in which the present decision was rendered were argued before Judge Hough for six days at the end of May and the beginning of June. In submitting the cases the record, which has been accumulating for the past five years, amounted to over 8,000 printed pages of testimony. The decison was rendered with unusual promptness. The arguments were made by William A. Redding, Samuel R. Betts and Franklin P. Fish, for the plaintiffs, and the defendants were represented by R. A. Parker, Frederick Coudert, John P. Murray and C. Benton Crisp.

R. A. Parker, of Parker & Burton, of counsel for the defendants, in a statement issued last June bearing upon the possibility of a decision, said: "As to the probable developments after the decison, it may be stated positively that if the patent is upheld we will appeal and if the patent is not upheld the plaintiffs are compelled to appeal by the contract between the A. L. A. M. and the other Selden interests. The only way this could be avoided by them would be to make a new contract and let the matter drop. At any rate, if an appeal is taken it would not get into the next court until probably a year from next October, and it would take perhaps six months in the Court of Appeals, so that perhaps it would be two years from the present before another argument would be held, and it can be seen that the patent will nearly have expired, in 1912, before the case would be settled. Should it become necessary it might even be carried to the Supreme Court."

DATE OF VANDERBILT CUP RACE IS OCTOBER 30

OCTOBER 30 is the date set by the Motor Cups Holding Company for a 1909 race for the famous Vanderbilt cup. Practically the same Nassau county course, though considerably shortened, will again be the scene of the Vanderbilt contest, which this time will be for stock car chassis racing craft.

The circuit may be less than 15 miles in length, of course utilizing the Long Island Motor Parkway to its fullest extent, and the necessary connecting State roads to complete a course.

The proper application for a sanction for the race has been forwarded to the office of the A. A. A. Contest board at Buffalo.

The race this year will be similar to last year's Motor Parkway Sweepstakes, which proved spectacular and decidedly interesting. Four classes of cars will compete simultaneously, according to classifications recommended by the general rules committee of the Manufacturers' Contest Association; the smaller cars being stopped at different shorter distances, leaving the larger ones, competing for the Vanderbilt trophy, to hold the stage for the final rounds of the competition.

The Vanderbilt Cup will be open to stock chassis in class 1 (451 to 600 cubic inches piston displacement) and class 2 (301 to 450 cubic inches), both running in one class for a distance of approximately 275 miles. Trophies will be offered for stock chassis in class 3 (231 to 300 cubic inches) at approximately 205 miles, and class 4 (161 to 230 cubic inches) at approximately 135 miles, while special trophies will be awarded to the winner in classes 1 and 2, competing in unison for the Vanderbilt Cup.

Entry blanks, now in the hands of the printers, will be mailed from the new office of the Motor Cups Holding Association, Denon Building, Mineola, L. I. Entry fee for Classes 1 and 2 will be $500 for each car; for Classes 3 and 4 $250 for each car.

A meeting of the Motor Cups Holding Association took place on Monday afternoon last, at which details of the race were acted upon, and the definitte announcement of a race authorized by W. K. Vanderbilt, Jr.

The course, as tentatively selected, is triangular in shape, with each side practically straight. The turns can be easily negotiated.

EXCELLENT PROSPECTS FOR FAIRMOUNT RACE

PHILADELPHIA, Sept. 13—The contest committee of the Quaker City Motor Club has been relieved of all but the actual running of the Fairmount Park race by a body of friends of the four local charitable institutions which have been named as beneficiaries. This body has taken the burden of looking to grandstands, parking spaces, tickets, ushers and the hundreds of smaller details off the hands of the committee and is working hard to have everything in readiness. In addition, the Q. C. M. C. has the active support of the city officials, who stand behind the club in all its arrangements, and, in fact, is a co-promoter with it. What this means in the matter of course protection and preliminary practice is manifest. The city will also take good care that the chances of accident are minimized. Last year officers were stationed every 80 feet around the eight-mile course; this year, with the assistance of the local militia, the cordon of guards will be doubled.

The Trophy That Will Be Contested For

The accommodations committee has arranged for 1000 parking spaces, distributed at the eight best points of vantage round the course. That this number will be much too small is apparent from the recent announcement that the Norristown Automobile Club and the Delaware County (Pa.) Automobile Club had each pre-empted 100 spaces, which together with the 50 already taken by the Q. C. M. C. disposes of one-quarter of the available accommodations. Similar applications are expected from many up-State, New Jersey and New York clubs. Runs to Philadelphia have already been arranged by several Pennsylvania clubs. As the race does not start till mid-day, it is possible for automobilists living within a radius of 100 miles to leave home in the morning and reach Philadelphia in ample time for the start.

Highway Commissioner William H. Brooks is personally giving his attention to the condition of the roadway. This year's course is identical with that of last year, which alone is a great testimonial in its favor. Oil wagons and steam rollers have been at work all the week, and will continue till the day of the race. The entire course will be ironed out several times by the heavy rollers; depressions will be filled up where Parkside avenue debouches into the Fifty-second street entrance, and the new cut-off road built last year will be still further widened and improved. The narrowest bit of road on the course is 20 feet wide. The exact length of the circuit is 7.8 miles, and the 25 laps called for will make a total of 195 miles.

The start and finish, as last year, will be on the South Concourse, in front of Memorial Hall, a relic of the Centennial Exposition of 1876. Repair and supply pits will be located immediately in front of the main grandstand on the South Concourse. There is naturally a great demand for parking spaces and box seats at this point, and the committee will get around the difficulties of allotment, and, incidentally, add a little to its receipts, by auctioning these choice viewpoints off to the highest bidders. The Warner Instrument Company is to erect and operate free of charge the score-board showing the positions of the first three cars which proved such a success at the Indianapolis track. An auxiliary prize of $100 cash has been hung up by G. H. Stetson for the driver of the fastest lap, and others of a similar nature are expected from local papers and business houses.

The following committees have been named by the Quaker City Motor Club to care for the details of arrangement:

Chairman—Dr. Joseph S. Neff.

Vice-chairman—Dr. Laurence F. Flick, Dr. Charles C. Hatfield, Dr. T. Mellor Tyson, Theodore M. Etting, Frank Hardart, Sr.

Treasurer—Mayor John E. Reyburn.

Secretary—Wm. F. Gleason.

Finance Committee—Dr. Laurence F. Flick, chairman; Daniel Baugh, Dr. Ward Brinton, Charles D. Burk, Louis C. Madeira, Col. Edward deV. Morrell, Joseph Walsh, James M. Wilcox.

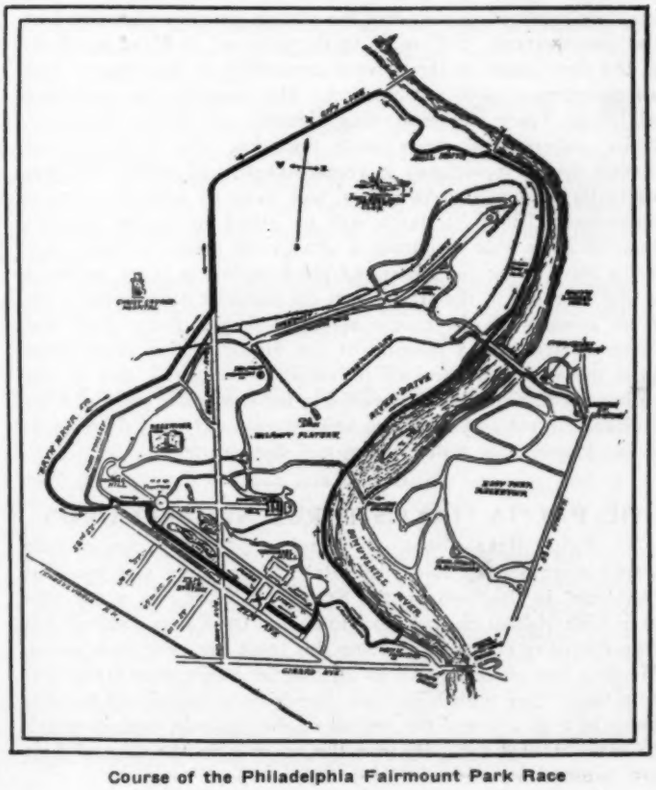
Publicity Committee—George M. Graham, "North American," chairman; Richard J. Beamish, "Evening Times"; H. L. Buckley, "Press"; John Cleary, "Inquirer"; Herbert C. Crowhurst, "Bulletin"; Harry C. Harbach, George W. B. Hicks, Richard Kain, "Record"; William M. Matos, William Rocap, "Ledger"; H. Starr Richardson, "Star"; George M. Schell, "The Automobile"; Frederick L. Weede, "Telegraph"; Clyde Woolson, "Item."

Police and Ushers Committee—Dr. J. Willoughby Irwin, chairman; Jacob H. Baltz, Samuel Castner, Jr., Frank A. Craig, Fred C. Dunlap, Dr. C. Lincoln Furbush, Arthur Folks, H. Laussat Geyelin.

Committee on Stands and Parking Places—Dr. Charles J. Hatfield, chairman; W. J. Clothier, Frank Hardart, Sr., Philip H. Johnson, William M. Ker, Robert L. Montgomery, W. D. Robinson, Edward D. Solenberger, Dr. J. Gurney Taylor, Richard C. Wood, J. R. Ludlow Gibbons.

TWO CHICAGO CLUBS IN ANNUAL BATTLE

CHICAGO, Sept. 13—The second annual reliability team match between the Chicago Automobile Club and the Chicago Athletic Association is scheduled for Thursday. There will be no technical committee examination of the cars at the completion of the match and only club members who are not affiliated in any manner with the motor car trade, are eligible to drive. N. H. Van Sicklen is captain of the Chicago Automobile Club team, and Charles T. Knisely, of the C. A. A., the same as last year.



Course of the Philadelphia Fairmount Park Race

CHICAGO MOTOR CLUB'S 1,000-MILE

CHICAGO, Sept. 13—Announcement was made to-day by the Chicago Motor Club that its annual reliability run this year would be held October 12, 13, 14 and 15, and that as usual it will be a 1,000-mile journey, spread over four days. The first day will carry the contestants 250 miles through Illinois, Iowa, and Wisconsin, and the night will be passed at Plattesville, Wis., returning to Chicago the second day. On the third day the run goes into Indiana, with the night stop at Indianapolis and the return made the fourth day.

On the first day the route goes through Elgin to Dubuque, Ia., and then to Plattesville, Wis., for the night. Returning the second day, the trail passes through Madison and Milwaukee back to Chicago. Going out again the third day, the way is through Joliet and Kankakee, Ill., to Crawfordsville, Ind., and from there to Indianapolis. The fourth day, coming back to Chicago, the contestants come by way of South Bend and Michigan City.

The rules have not been announced as yet, but the A. A. A. classification scheme will be followed.

One entry has been made—a Falcar, which will be driven by W. H. Pearce, who handled the car in the Indiana trophy road race, and which will be No. 1 in its class. The reliability this year goes into territory heretofore not touched by the Chicago Motor Club and the route selected covers all sorts of going. In Wisconsin many hills will be encountered, and it is expected the run will be the best of all the local organization has promoted and it has several record-breakers to its credit.

ANOTHER 24-HOUR RACE FOR BRIGHTON

NEW YORK, Sept. 14—The Motor Racing Association has announced that it will hold a 24-hour race at Brighton Beach this month. The dates have been set for Friday and Saturday of next week, September 24 and 25. The track has been materially improved since the last contest, and the surroundings have also been given attention. The oval has been resurfaced entirely and will be made as smooth and hard as possible. All the posts and fences around the infield have been removed, and the trench covered over, so that if any car runs off the track or is dangerously crowded in rounding the curves, its crew need not fear the consequences. Still more to the point of avoiding accidents is the step taken by the drivers' committee in deciding to give all operators a close examination. The committee is composed of Joseph Tracy, chairman; Guy Vaughn, and Arthur Campbell. Some criticism has been made regarding the proficiency of certain drivers nominated in recent events, and unless the ones hereafter are well known they will have to undergo a rigid inspection. The contestants will be asked to decide whether they desire a rule requiring a change of crews at least once every three hours. A system of block signals is being arranged at the entrance to the track from the paddock, to prevent a car from going upon the course when another is flying down the home stretch. At a meeting of the Motor Racing Association held to-day it was decided to admit lower-priced cars in the 24-hour race. This action resulted in the immediate entry of four Buicks, Chevrolet and Burman being named as two of the drivers. It is expected that a dozen cars will start in the race.

DE PALMA MAKES THREE NEW RECORDS

ST. PAUL, MINN., Sept. 11—Three new records for circular tracks were set up to-day by Ralph De Palma and his Fiat "Cyclone" in the meet on the State Fair track. In a one-mile race with Kilpatrick and his Hotchkiss De Palma lowered his own record of 0:51 flat, made on this track last year, to 0:50 4-5. He took two successive slices off the three-mile record, the first in a match race with Kilpatrick, in which he negotiated the distance in 2:38 4-5, and the second in the ten-mile race, in which he made it 2:38 flat. He won the ten-mile in the time of 8:49 3-5, another record.

ATLANTA'S SHOW SPACES DRAWN

Atlanta's National Automobile Show will have a representative display of American and foreign cars, this having been made known in the drawing for space which took place September 8 at the headquarters of the N. A. A. M., No. 7 East Forty-second street, New York City.

Under the supervision of S. A. Miles, general manager of the N. A. A. M., and Alfred Reeves, general manager of the A. M. C. M. A., the drawing proceeded with some 60 manufacturers seeking space. Naturally the main hall was apportioned to those who secured first choice, the fortunate ones including Packard, Franklin, Winton, Peerless, Pierce, Stevens, Maxwell, Mitchell, Stoddard-Dayton, Cadillac, Oldsmobile, Pope-Hartford, and Woods. In what will be known as Taft hall, which is nearly as large as the main hall, and is located on the main floor in the front part of the building, will be exhibited Rambler, White, Premier, Mora, Marion, Reo, Locomobile, Ford, and Buckeye.

On the elevated platform overlooking the main hall, there will be Marmon, Austin, Dorris, Glide, American, Jackson, Moline, National, Knox, Chalmers-Detroit, Elmore, Stearns, Pennsylvania, Hudson, Babcock, and Apperson.

Those in the main part of the building will include Autocar, Studebaker, Studebaker E-M-F, Standard, Jewel, Hupmobile, Overland, York, Selden, Speedwell, McIntyre, Brush, and Cartercar. In the basement will be located Columbus, Renault, Sultan, Streator, Fiat, Black, Interstate, Great Western, Rauch & Lang, Allen-Kingston, and Rapid commercial vehicles. The Rapid Motor Vehicle Company, Pontiac, Mich., have taken the largest space allotted to any one concern.

Members of the Motor and Accessory Manufacturers have drawn for space, but the announcement has not yet been made.

HOMER W. HEDGE VICTIM OF TYPHOID

Captain Homer W. Hedge, automobile and aeronautic enthusiast, died September 10 at his home, 31 West Eighty-fourth street, New York, of typhoid fever, after an illness lasting a week. Captain Hedge was the principal organizer and first president of the Aero Club of America, and one of the founders of the Automobile Club of America. As captain in the First Signal Corps, National Guard of New York, he had many friendly connections with men in the military service.

Born in New England forty-eight years ago, Mr. Hedge came to New York at an early age and took up advertising as his business. He was soon in business for himself, and at the time of his death was president of the Homer W. Hedge Company, advertising agents, at 366 Fifth avenue. In the fall of 1905 Captain Hedge, together with Cortlandt Field Bishop, J. C. McCay, A. Lawrence Rotch, Augustus Post, Colgate Hoyt, Charles Jerome Edwards, and Dave Hennen Morris, organized the Aero Club of America, and he was elected its president.

Captain Hedge is survived by his wife and daughter, Elizabeth. But few of his friends in the city knew of his sudden illness, and all expressed the greatest regret when the news of his death was made public.

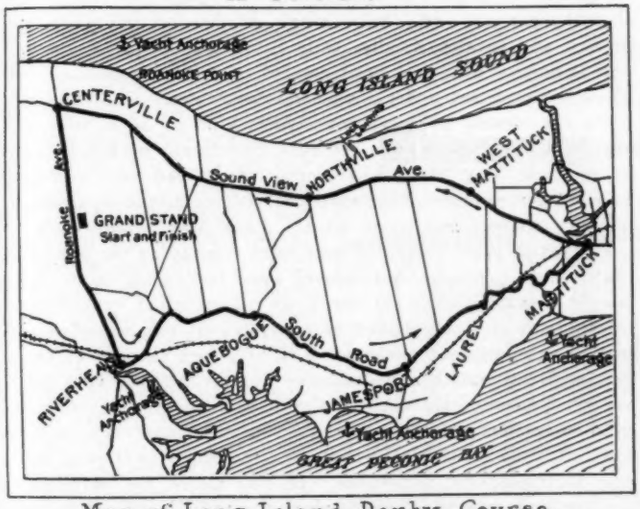
H. M. ADAMS, ROYAL SALES MANAGER

CLEVELAND, Sept. 11—Hobart M. Adams, long in the employ of the White Company, of this city, at the head of its Ohio sales department, has accepted the position of general sales manager for the Royal Tourist Car Company. The acquaintance of Mr. Adams with the trade extends throughout the country. His engagement with the Royal Company comes after its first season's output has been marketed, and that, too, as rapidly as manufactured. The company is the reorganized former Royal Motor Car Company, and the output of the present season, which was conservative, will be nearly doubled during the coming year, says George J. Dunham, president of the company.

Connecticut's new motor law went into effect September 1. All registrations expire December 31 of each year.

EASTERN LONG ISLAND'S STOCK CAR DERBY

On Sound View Avenue. Speed is Possible.



Map of Long Island Derby Course.

Said to be Only Dangerous Turn in Course

"LONG ISLAND'S Stock Car Derby" will take place September 29, over what is known as the Riverhead-Mattituck course. The A. A. A. stock chassis definition, of course, will govern. The Motor Contest Association, with headquarters at 1777 Broadway, is the announced promoter of the event, but all Suffolk county is engaged in the proceedings to a greater or less extent. The county's sheriff will provide the police protection of the course, assisted by scores of motorcyclists. 'Tis said that a Supreme Court judge has accepted the position of honorary referee.

Five classes will be provided for in the Derby racing, from $851 to $4,001 and over, the trophies for which will be given by Long Island towns and the Long Island railroad, besides several from other sources. In addition the participating drivers will receive one-half of the profits of the meet, providing any surplus remains.

The course is pronounced by such well-known drivers as Robertson, Strang, and De Palma, as being one of the fastest in the country. There are two stretches of nearly nine miles each, and only two towns are touched, one being little more than a village. Situated some distance from a trolley line, the crowd present will have to come mostly by automobiles and motor boats, there being four landings for the latter within a short distance of the grandstand. The course is a wide one for the most part, and runs through picturesque country. Its oiling will be done by the county, with the best of material supplied by the Standard Oil Company. The start and finish will be about three miles from Riverhead.

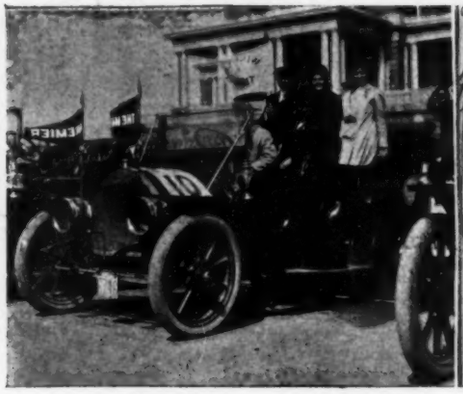
With practically five races in one means that there will be five finishes within an hour, as the small cars will travel 91 miles, the next class, 113 miles; third class, 136 miles; fourth class, 182 miles; and the big cars will bea sked to cover 227 miles. Predictions are that over 60 miles an hour will be the average of the big winner.

Recently at the Lowell races, W. J. Morgan, president of the Motor Contest Association of New York, and A. D. Corwin, discussed the final arrangements with Chairman Hower and other members of the Contest board. Alden McMurtry was designated as the representative of the Contest board to supervise the races, and George Robertson was named to look after the interests of the drivers.

The course is some 80 miles from New York City, which means that a comfortable half-day tour is available to those who may care to drive to the eastern end of Long Island.

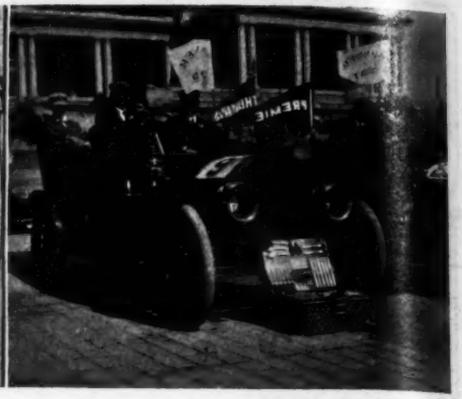
SYRACUSE TRACK MEET THIS WEEK

SYRACUSE, N. Y., Sept. 13—Preparations have been completed for the third annual automobile track meet of the New York State Fair Association. This will be held on Saturday and already the entries promise the most successful event of the series. There are nine classes in all, six of which are for automobiles and three for motorcycles, including five and ten-mile races, a 50-mile, and time trials. Cash and trophies have been set up as prizes, and if any car succeeds in breaking the track record of 51 seconds, the trophy will be in money instead of a silver cup. The track is considered to be the best one-mile circuit in the country, without dust, and as hard as could be desired. The executive committee in charge of the meet is composed of H. W. Smith, M. W. Kerr, C. Arthur Benjamin, Forman Wilkinson, F. R. Bump and J. H. Valentine.



Lancastrians Who Won Third Place

Allen Sheldon and H. O. Smith



Second and First Prize Winners

FROM QUAKERTOWN TO CAPE MAY IN 50 PREMIERS

PHILADELPHIA, Sept. 13—Fifty green-and-white pennanted Premier cars left this city last Saturday morning on the first annual Cap May reliability run of the Motor Company of Philadelphia, local agent for the Premier. Leading the procession was the "Flying Squadron," composed of the three Glidden Tour Premiers, with President H. O. Smith of the Indianapolis company on board. All the cars in the run except five belonged to private owners, gathered from Philadelphia and the neighboring cities, and these had brought their wives and families with them in expectation of a day of merrymaking.

The object of the run was to equal as near as possible the time of a pathfinding car which had been secretly sent over the road in advance. The winner turned out to be B. E. Block, of Norristown, who received the silver loving cup offered by President Smith and the Premier Company. T. E. Gibberson, of Toms River, was awarded second prize, a fully equipped lunch hamper; S. N. Root, of Lancaster, got a set of Thermos bottles and a smaller hamper, and Mrs. William J. Hendren, of Philadelphia, won the ladies' prize, a silver Thermos bottle with four cups, for making the best guess of the winner's time. The figures were not announced, for the reason that auxiliary prizes had been offered to the citizens of the towns along the route guessing nearest the official time, and many of these estimates had not yet been received and tabulated.

Arrangements for the run had been progressing for the past two months, and the entire route was resplendent with gaily colored posters. Naturally the residents of the towns and villages to be passed through were on the lookout and a rousing reception was everywhere accorded the tourists. At Camden Mayor Ellis joined the party and proceeded with them to Cape May. At the latter city a committee of citizens met the tourists and complimented them on having made the journey without stragglers or accidents of any kind. Though the cars were slightly spattered with mud, every member of the party was present and enthusiastically ready for the fun.

A triumphal arch had been erected on Ocean Boulevard, and as each car passed under a gun was fired, which was responded to by the tooting of every conceivable kind of horn, siren and other noise-making device. All cars were finally parked in front of the Cape May Hotel, where preparations had been made for an elaborate dinner. Afterward the visitors attended a complimentary concert and dance of the Cape May Motor Club.

The entire party remained over until Sunday as the guests of the Premier Company, and enjoyed some fast racing on the magnificent beach in front of the hotel. The return trip Sunday afternoon was accomplished as enjoyably as the Saturday run, and likewise without mishaps. The fifty cars reached Philadelphia with full ranks, and disbanded for their homes with pleasant recollections of the trip. Every participant hopes that the promise implied in the name, the "first annual" run, will be fulfilled, and that they will have an opportunity next year to repeat their pleasant experience. In this desire, the participants are not alone, the townspeople along the route being of the same idea. The principle of interesting the towns is commendable.

Where the Cars Were Parked at the Finish in Front of the Big Hostelry at Cape May—The Cape May Hotel

Automobile Wheels, Rims and Tires

By Thos. J. Fay

BARRING the use of inferior grades of wood, and assuming that all wheels, insofar as the woodwork is concerned, should be of selected grades of second growth hickory, or equally good growths of wood, there still remains many points of detail leading to quality on a high plane, or the reverse.

In rear wheels, since the twisting moment of the motor must be transmitted to the spokes of the wheels, this torsional effort must be resisted by the wood at the miter, and if the hub-flanging is not clamped tight, it is highly improbable that the joints will be free from "working," which later condition soon leads to something worse.

Clamping Bolts Must Be Prevented from Turning—When hub-clamping bolts are tightened up, unless they are so pinned that they will not turn when the nuts are tightened up, it is difficult to apply sufficient pressure, and in the absence of this pressure the clamping effort will be insufficient. Fig. 19 depicts a hub in which the clamping bolts are provided with means for preventing the bolts from turning when the nuts are being tightened, a flattened extension, of triangular shape, just under the heads of the bolts, engages in a slot in the flange. In this hub the flange is made integral with the brake-drum, which also serves for the sprocket wheel, and the torsional effort is taken by integral metal at all points so that the woodwork is not required to labor under shock loading. As an incident attention is called to the use of a single (large) annular ball bearing in this particular case. It is because the bearing is very large that it may serve, and in some ways the scheme is commendable.

The nuts used on the hub-clamp bolts, in this example, are castellated, and in relation to this phase of detailing, it is enough to point out that it is not necessary to provide castellated nuts if the flanges do not have to be removed, which is true in almost every example of hub used in automobile work. When the nuts are not castellated, if they are screwed up tight, owing to the elastic qualities of the wood, they will stay on, although it is common shop practice to rivet over the heads to prevent them from backing off. There is no objection to this practice, although it is not necessary to mutilate the heads or nuts in the process.

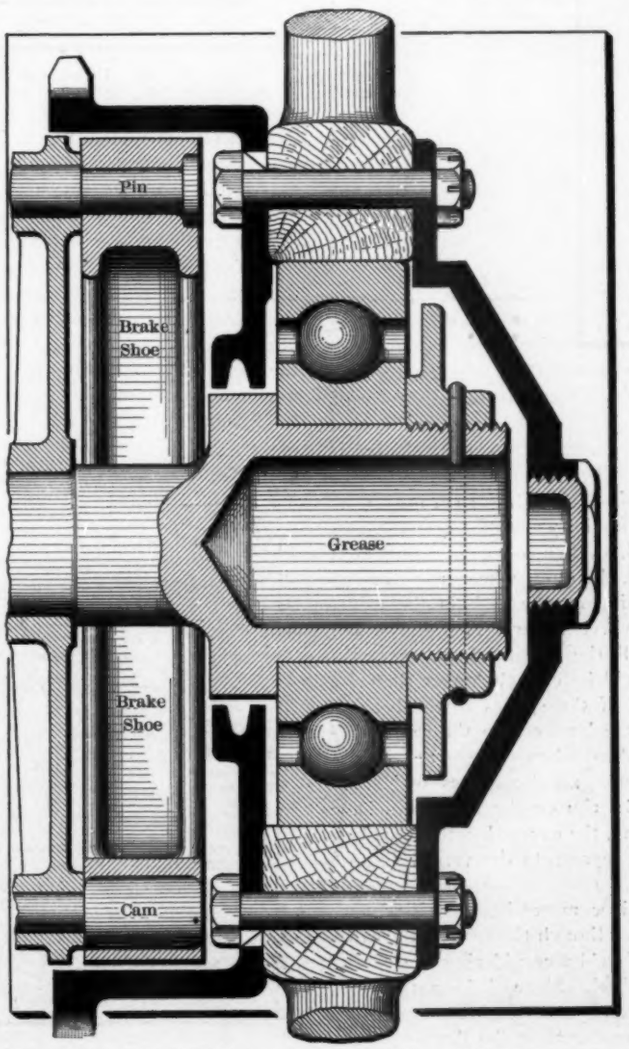


Fig. 19—Section through rear wheel with combination brake drum and inner flange

Spokes Are Made in Divers Details of Contour—A certain symmetry of contour is necessary if spokes are to be machine made, and there is positively no objection to this method of manufacture, provided the spokes are not sacrificed to the process. Fig. 20 depicts a well-made spoke, in which all the advantages known to the art of wheel making are embodied, and the depth of flanging is that which experience has dictated as adequate for the needs. This example (taken from the Thomas Model M) represents a 1910 effort, and has the benefit of much past experience. The dimensions are given so that this detail of the subject will not have to be discussed further, excepting to say that the brake-drum is bolted to the spokes in the manner as shown, which ties the drum to the spokes at a considerable radius, and without a particle of doubt, eliminates excess twisting moment on the woodwork.

The ability of a spoke, if it is well shaped, is represented by the thickness in the axle plane at the hub-flange, and in this case this dimension is 1¾ inches. The second point of importance is at A-B, at which point the major diameter is also 1¾ inches, but in the plane of the wheel, instead of, in the plane of the axle At the tenon engaging the felloe, this spoke is 1⅝ inches of the major diameter, which is in the plane of the axle, and in the plane of the wheel the minor diameter of the elliptic section is 1 3-16 inches, which dimension prevails in this plane from the point A-B out to the felloe.

In some types of spokes the section at the engagement of the felloe is round (to unit radius) and reduced gradually, to the point in the section marked A-B, rather with the expectation that the spokes will be very flexible at this point in the section, and in order to reduce the tendency of the spokes to work at the miter between the hub-flanges. The trouble with such spokes is that they are not easily fashioned by a machining process, and it is highly improbable that they will prove to be of greater flexibility than the type as here illustrated.

Fig. 21 shows a section of the wood at the miter in another type of wheel, in which the radial depth of flanging was 2¼ inches, and the axle thickness of the wood was 2⅛ inches. This wheel was used on a 60-horsepower car and worked so well, insofar as this part is concerned,

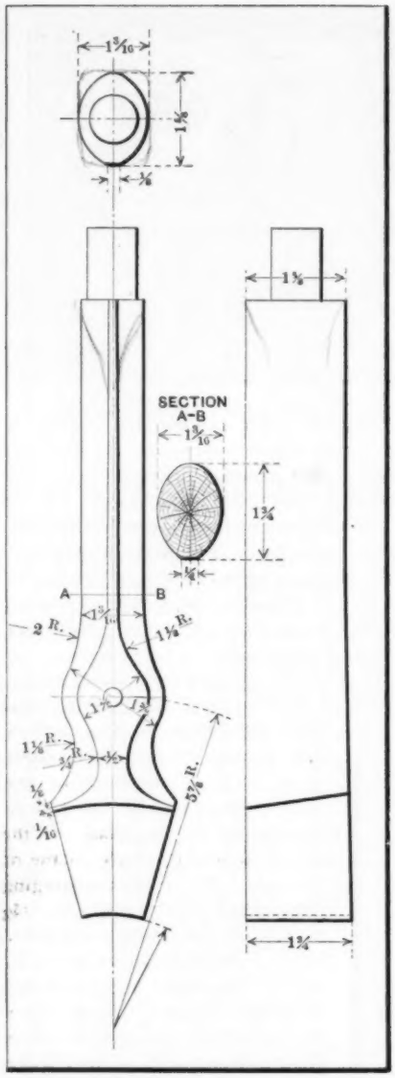


Fig. 20—Rear wheel spoke in Model M Thomas car depicting proportions, twisting, bending, and compression

that it will serve as an example of a safe depth of flanging, and also as a guide in fixing the sheer section of the spokes from the point of view of stresses induced when cars of great power skid if the wheel is not dished. Fig. 22 shows the same spoke at the tenon engaging the felloe, indicating the manner in which the spoke is wedged into the felloe, but this plan is defective unless the wedge is placed 90 degrees around from the point shown, in order to eliminate the tendency of the spoke to split the felloe. In any case it is a good plan to bolt through the felloe on both sides of the spokes in order to avoid the splitting tendency, which is accentuated when cars are driven around turns of short radius at an exceedingly high speed.

Fig. 23 depicts the Schwarz type of wheel, showing how the miter is overlapped, thus making it possible to true up the woodwork, at will, independently of the hub, and that this plan aborts the tendency of the miter to work loose, is one of the claims of the maker. They stand up well.

Advantages of Dishing Wheels—Referring to Fig. 24, it will be seen that the felloe is not in the plane of the miter, and the dish of the wheel is outward. When a car is going at a relatively high speed around a turn, the outer wheels are stressed in such a way that the tendency is to set a dish in them just reverse to the dish given by the wheel maker. The shorter the spokes are made, the greater will the dishing have to be in order to be sure that the spokes will be enough longer than the radial distance from the hub end of the spokes to the bearing against the felloe. If the spokes are longer than the radial distance from the hub to the felloe, then, when stresses are set up, tending to dish the wheel in reverse, all the spokes will serve as members in compression, and the rim on the felloe will have to do the work. As the figure shows, the excess length of spokes, marked "difference" in the figure, represents the versed sine of the angle of the spokes.

Wood is of such great strength in compression that it renders wheels practically indestructible even though the sectional area of each spoke may be reduced considerably, considering the use of from 10 to 14 spokes in each wheel. Since dishing transfers skidding stresses to the rim, inducing compression moments in the spokes, it eliminates shearing moments at the flanges of the wheels, and for this reason it is not necessary to have the spokes of very great width in the plane of the axle, near the hub. If the wheels are dished, remembering that this practice results in transferring all strains to the rim of the wheel, it is plainly indicated that the stationary rims of the wheels must be of sufficient strength to sustain under the pressure. Just what the side pressure might be under ordinary conditions is not necessary to consider, since it is possible to conceive of a case in which all the weight resting on both rear wheels might come as a lateral thrust, if the inner wheel leaves the ground, and if the outer wheel is in

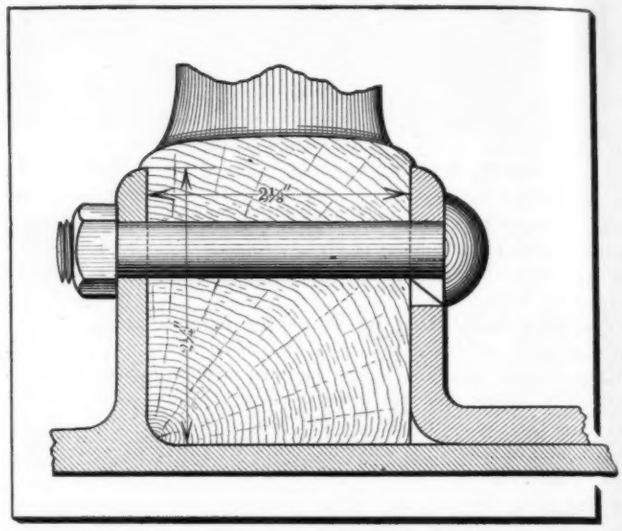


Fig. 21—Section of a hub at the miter, showing depth of flange and scheme of clamping

a rut so that it cannot skid. Taking this as a basis, it is only necessary to compute for the effect of centrifugal force of the car and involve the angle of the spokes, in order to ascertain the thrust of the spokes, tending to disrupt the rim.

Practical Details Involving the Woodwork—In automobile wheels, if the rim proper is placed over a stationary rim as it is in demountable work, the chances of wheel trouble may come, as in ordinary carriage wheels, by what is known as "rim binding." A rim-bound wheel will not give satisfaction, and if the same wheel is allowed to stand for a time in a damp place it will warp out of true, and in this warped condition it not only looks unsafe, but will be unsafe since the stresses will not then be disposed uniformly in the section of all the spokes.

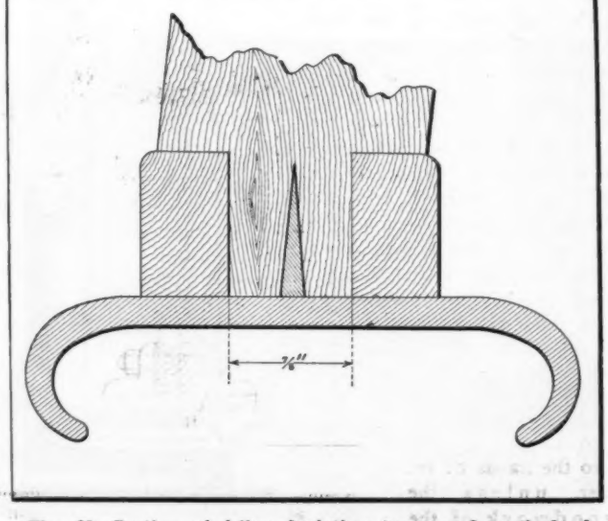


Fig. 22—Section of felloe depicting tenon and method of wedging which will split the felloe

Undue pressure of tires will spring spokes sidewise, and "bastard spokes" will have a wide influence on the results. Take a wheel, for illustration, having half of the spokes of suitable selections of second growth hickory, and the balance of "swamp" or willow hickory (this grade of hickory is soft and spongy), it will not behave like the regular (accepted) wood, and with a little pressure, wheels so made will spring out of true. Dampness will do much to engender wheel troubles of this sort, and in view of the amount of washing which automobiles naturally

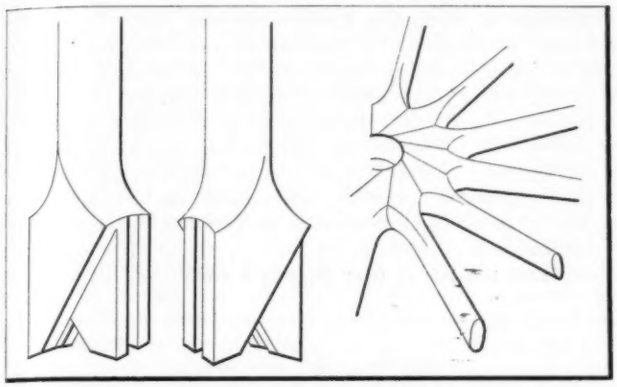


Fig. 23—In the Schwarz wheel the miter joints are made using a dovetail and tenon

fall heir to, it is of the greatest importance to select wood for wheels that will be free from bastard varieties and to put the wood through a uniform seasoning process.

So-called second growth hickory is becoming more scarce every day, and in England, for illustration, there is a growing tendency in favor of wire wheels. In America, in view of the rusting question, it is not believed that wire wheels will find favor just so long as wood holds out, and while it may be necessary to lower the standard a little in time, even so wood has not as yet reduced in quality so much that it is necessary to put up with the rust problem. True, it is barely possible that high nickel steel wire spokes may ultimately be made, in which corrosion may be practically eliminated, but it is a well established fact that merely nickel plating the metal work is not good assurance of long service without the attending rust evil. Wire wheels may be made strong enough for the purpose—of this there is no question—but wheels have to roll through water, mud and whatever else abounds in city streets, so that the rust question stands in the way, and it represents a formidable barrier to the use of wire wheels.

When a car falls into the hands of the user, unless the woodwork of the wheels is kept water-tight by persistent applications of paint, crooked wheels will be in evidence, and wheel failures will follow. It is a fair inference that many wheel failures are due to lack of paint, copious applications of water and wild driving.

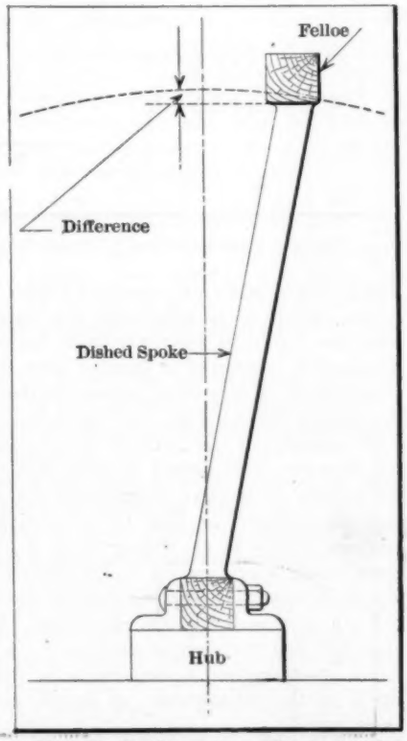


Fig. 24—Section of a wheel showing the dish, which has strength to resist skidding and lateral stresses

Front Wheels Have But a Single Duty—When the driving is done through the rear wheels, the duty of the front wheels is limited to fixing the direction of the car, aside from the question of acting as rollers, which is common to all road wheels. Driving moments are not engendered, because there are no twisting moments of the character which must be borne by the rear wheels, and the spokes may, therefore, be reduced in section accordingly. Fig. 25 shows front wheel spoke work used in the same car as the rear spoke work shown in Fig. 20. The section A-B is slightly less (12 spokes are used in both front and rear wheels) and in the absence of the brakedown, the front wheels are somewhat more resilient. All necessary dimensions are given in the figure. A brief inspection of these two figures representing the front and rear wheel spokes as used on the same car, and that a high-powered, high-speed vehicle, will show that for assembling and other conveniences, the lateral depth has been kept at the same figure, 1 3-4 inches, while the variation to account for the differing nature of the work done by the two comes into the thickness, this being 1 3-16 inch for the hard-worked rears and but 1 inch for the fronts. While seeming a very small difference, this nevertheless is 19 per cent increase of what is really a diameter.

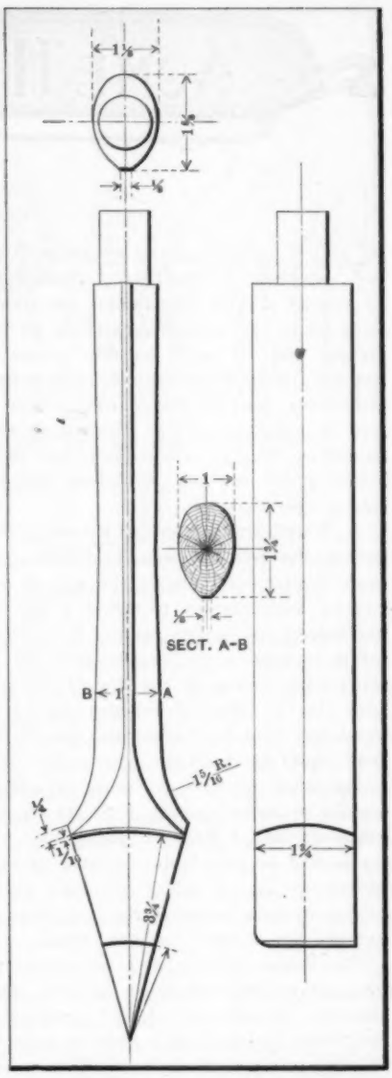


Fig. 25—Showing a front wheel spoke suitable for resilient work

(*To be continued*)

RELATION OF AIR TO GASOLINE

Because automobile gasoline is composed of various percentages of the several available fractions of hydrocarbon distillates, it is quite out of the question to fix upon the relative proportions of fuel to air, on an exact basis. Since, however, the average carbureter is capable of altering the ratio of air to fuel over broad ranges, it is not necessary to know the exact ratio in order to attain the best results. In the meantime, an approximation is necessary, since, in designing, and adjusting carbureters, it is well to fix upon the ratio in such a way as to have the variations allowed for, up and down, from an approximate average. The mixture becomes explosive when 10,000 volumes of air dilute one volume of gasoline. The best results follow when the relation is one volume of liquid gasoline to 8,000 volumes of air. With one of gasoline to 3,500 of air, it is non-explosive.

Some Hints on Ignition Testing

By C. Wadsworth

SINCE the life of any automobile ignition battery necessarily depends on the current-consumption of the spark coil, it is evident that if adjustments are made in conformity with the indications of current-measuring devices, the battery will last longer and all parts of the ignition system will give better service. Moreover, the installation of such instruments as a permanent part of the ignition circuit puts the operator of the car in possession of a continuous and *visible* record of performance through which faults can readily be detected and remedied under working conditions and often while the car is in actual operation.

It is well known that by adjusting the coil-vibrator or contact screw, the consumption of current can be varied within quite wide limits, reduction of the gap at the vibrator increasing the current consumption, too small a gap causing rapid depletion of the battery, as well as pitting and sticking of the vibrator points, while increasing the gap reduces the current consumption, too wide a gap lessening the flow of current to such an extent as to give rise to skipping or misfiring. It is also well known that what has been said about the gap at the vibrator points applies with equal force to the gap at the spark plug points.

Just what adjustments of the coil-vibrator and spark-plug gaps should be made in order to secure the highest degree of sparking efficiency and battery economy with a given coil may conveniently and accurately be determined by means of the apparatus shown in Fig. 1, which is made a fixed part of the battery circuit to show whether the operating conditions of the ignition system are normal or otherwise.

The device shown is a voltammeter especially designed for eliminating guess work in ignition testing under working conditions. It consists of two instruments, an ammeter and a voltmeter, mounted on a common base that is attached by screws directly to the dash if of wood, or to an insulating block in case the dash is of metal. The voltage of the primary, or battery, circuit is measured by the instrument at the right, while the strength of the current in amperes is measured by the one at the left. Both instruments operate on what is commonly known as the D'Arsonval principle, a permanent magnet being employed to create a strong magnetic field of practically unvarying intensity, within which a rectangular coil of fine wire, wound on a centrally pivoted aluminum open-frame bobbin, mounted between the pole pieces of the magnet, is made to rotate, against the opposing influence of a spring, by the current that passes through it. Attached to the coil bobbin or frame is a pointer that moves over a scale so graduated as to indicate the strength (amperage) or the pressure (voltage) of the current, causing a deflection of the swinging coil from its normal or zero position.

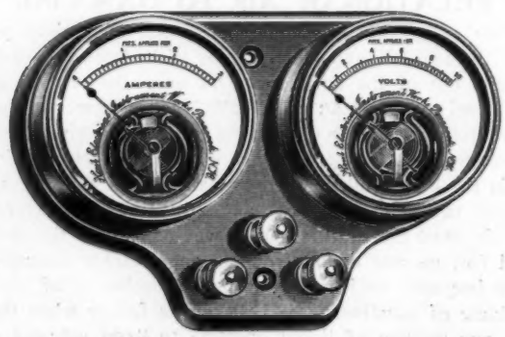


Fig. 1—Hoyt Voltammeter which simplifies ignition testing

Method of Reducing Current Losses—An extended description of the details of construction and principles of operation of the instruments would here be out of place, but attention may properly be called to the fact that by the use of a suitable resistance coil placed inside and forming part of the circuit of the voltmeter, the current loss due to its operation is reduced to a negligible factor, notwithstanding that the voltmeter is connected across the main leads of the circuit, as shown in Fig. 3, in the same manner as an incandescent electric lamp.

The ammeter is connected in series in the primary circuit, but the current is made to pass through a conductor, SH, termed a shunt, which, while of somewhat higher resistance than the rest of the circuit, is of sufficiently low resistance to make the current loss due to its use a negligible factor also. The coil of the ammeter is connected in parallel with the shunt, forming a divided circuit, a very small portion of the current passing through the coil of the ammeter and the balance through the shunt.

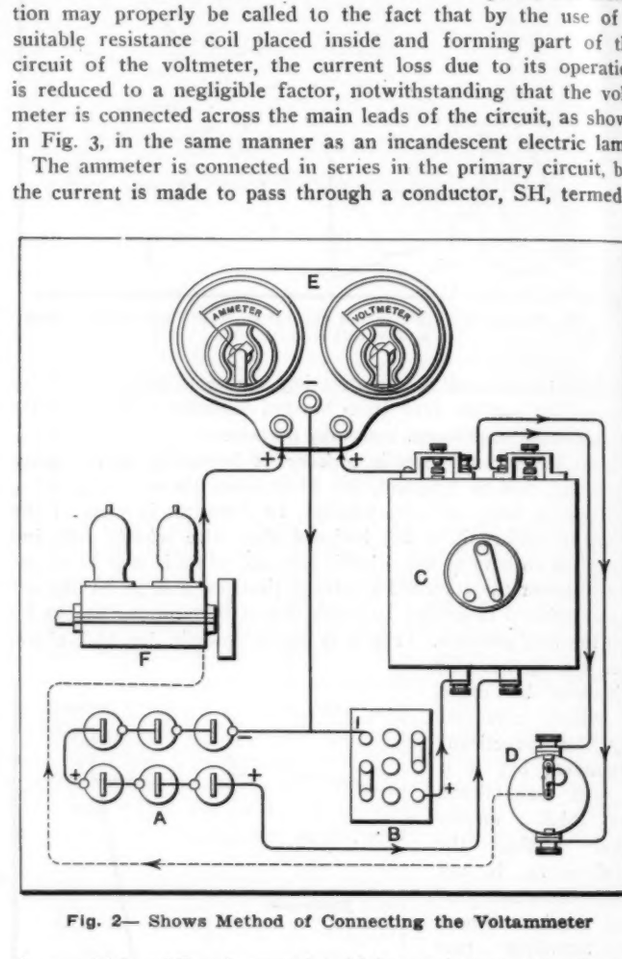


Fig. 2— Shows Method of Connecting the Voltammeter

On consulting Fig. 2, which is a conventional diagram, showing how the voltammeter is connected up, it will be seen that the carbon or positive terminal of the dry-cell battery A, and also the positive, or plus (+), terminal of the secondary, or storage, battery B, are connected to the terminals of the coil C, from which wires are led to the timer D by which the primary circuit is closed. From the contact screw of either of the coil units, a wire is led to the right-hand binding post of the voltammeter, and the zinc, or negative (—), terminals of both batteries are connected to the center or negative binding post terminal of the voltammeter, as shown, instead of to the ground, as is usual.

Current Flows Through the Primary Winding—The return-circuit wire is attached to the left-hand binding post of the

voltammeter. Current from the primary battery A, or from the secondary battery B, whichever happens to be in use, passes through the primary winding of the coil C when the circuit is closed by the timer D. From the coil C, current flows into the voltmeter through the wire attached to the right-hand binding post, and out to the center binding post and thence back to the battery. When the timer closes the circuit through the coil a part of the current that flows through the timer ground circuit, passes into the ammeter and out to the center binding post, thence back to the battery. Most of the return current passes directly from the left-hand binding post to the center binding post through the shunt SH. The return circuit between the timer and engine in Fig. 2, and between the timer and left-hand binding post in Fig. 3, is indicated conventionally by a dotted line, the direction of current flow being shown by the arrows.

On reference to Fig. 3, it will be seen that the voltmeter V indicates the condition of the circuit regardless of whether the circuit is closed or open. This diagram also shows how the voltmeter is connected across the two main leads of the circuit beyond the switch S. If it were connected up between the switch and the batteries, it would be in circuit all the time, regardless of whether the coil switch S was open or closed, but by connecting it across the main conductors just the other side of the switch, as shown, it is in circuit only during the time that the switch S is closed.

As the timer T makes and breaks the main circuit at a point still farther on, the voltmeter indications are not affected by the operation of the timer. In other words, the voltmeter practically forms a closed circuit of very high resistance, including only that part of the battery circuit which lies between the batteries and the coil. The ammeter, however, forms a part of the main circuit beyond the coil and therefore responds to the makes and breaks of the timer, but the voltmeter does not.

Voltmeter Forms a Closed Circuit—The voltmeter circuit, when the switch S is closed on the dry battery side, is indicated on Fig. 3 by the three-dot-and-dash line, which is intended merely to show that, as stated above, the voltmeter serves as a closed circuit in which the direction of current flow is as shown by the arrows. The current flowing from the dry battery DB, through the switch primary coil P′, timer T, ground and left binding post of voltammeter, passes through the shunt SH and ammeter coil A, which is connected in parallel with the shunt, so that a pre-determined portion of the current passes through it, the balance of the current passing through the shunt. The respective resistances of the shunt and ammeter coil being known, it is an easy matter for the manufacturers to calculate the current which will pass through the combined circuit.

Ordinarily the method of wiring shown in Fig. 2 will correctly connect the instruments in circuit, but with some types of coils, as, for example, the Kingston, the wire leading to the right-hand or voltmeter binding post, must be attached to one of the hexagon nuts on the bottom of the coil box, as shown in Fig. 3, to which the same reference letters as are used in Fig. 2 are applied.

Similarly the copper or brass strip by means of which the several units of some coils are connected, may also be used, instead of the contact screw block, as a place of attachment for the wire leading to the voltmeter.

How to Proceed with the Test—In proceeding to make tests with the voltammeter, after having connected it up as indicated, the first thing to do is to make the distance between the spark-plug points as nearly uniform as possible, so that the width of the gap shall not exceed 3/100 inch and then file the platinum points of the vibrators and contact screws so as to be sure that they are perfectly flat and true as well as smooth.

For this operation, a Nicholson XF Swiss file, about number 6 cut, should be used, because the ordinary fine-cut file is too coarse and cuts away too much metal. After filing the points, the contact screws of each unit should be screwed down until the vibrator has a play of about 1/16 inch between the screw and the iron core.

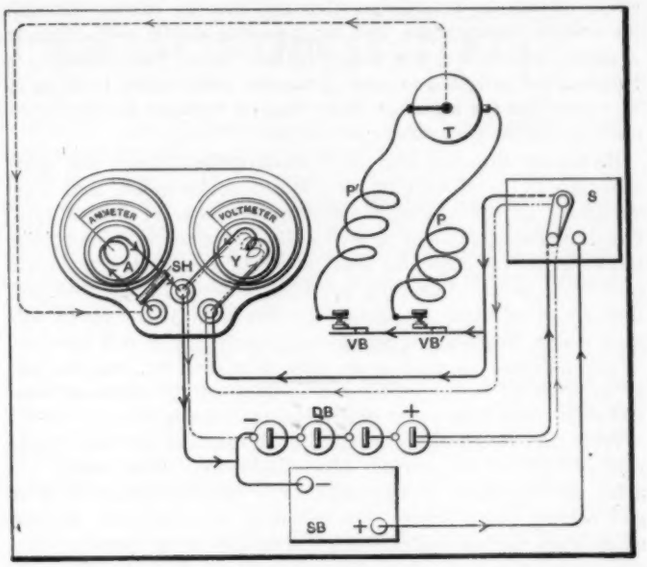


Fig. 3—Voltmeter Indicates Condition of Circuit

Then, with the gasoline supply to the carbureter shut off and compression relief cocks open, turn the engine over until the timer makes contact and sparking takes place in one of the cylinders, any one being equally good.

Note the reading of the ammeter when the timer closes the primary circuit, and if the current consumption of the coil is greater than 8/10 ampere, increase the vibrator gap by unscrewing the contact screw, and thus decrease the flow of current. Should the vibrator fail to act, however, screw down the contact screw and thus decrease the gap until the vibrator is brought into action. Proceed in the same manner to adjust each of the vibrators until the current consumption of the coil units is equal throughout their number.

In making adjustments while the engine is at rest, the circuit being closed by the timer for a considerably longer interval of time than when in actual operation, it is necessary to set them for a current consumption about twice as great as is de-

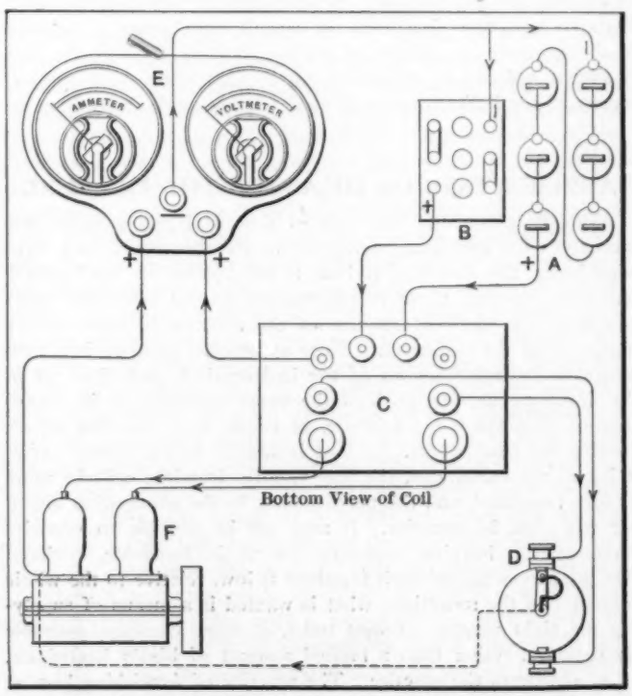


Fig. 4—Wiring Diagram, Showing Coil Binding Posts

sired, because in actual operation the flow of current through the coils is intermittent, and the ammeter needle will stand at a point representing the mean current flow. For example, a two-unit coil adjusted to take ¼ ampere would show from ⅜ to ½ ampere on the ammeter, depending on whether the period of make or period of break is the longer.

Effect of Construction on Consumption—Since the construction of a coil affects the current consumption, and wide variations in the sparking efficiency of different makes arise from differences in usage as well as construction, no definite rules can be given for the exact point at which a coil vibrator should give best results. Generally speaking, however, it may be said that a coil adjusted to operate on less than 3/10 ampere will give a thin, weak spark which would only fire a rich mixture. When adjusted to take more than 8/10 ampere, trouble will be experienced from pitting and sticking of the platinum contact points and from rapid deterioration of the battery.

With the voltammeter in circuit, observation of the normal rate of deterioration, after adjustments have been made, enables the operator to ascertain the relation between mileage and battery consumption. For instance, if a car will run 300 miles when the current consumption is such as to cause a pressure loss of ½ volt, then the car will run another 300 miles with a like drop in voltage, whether the battery is of the primary dry-cell or of the secondary storage type. Hence a glance at the voltmeter will enable the operator to judge what mileage can be obtained from the battery before it is exhausted.

Whatever may be the cause of a change that affects the battery circuit, the voltmeter gives instantaneous indication thereof, the needle or pointer remaining steady only so long as conditions are normal. With a loose contact, the needle would oscillate back and forth; with a broken wire it would not move form zero; with a poor contact due to a corroded terminal, the reading would be lower than normal; and in case one or more cells should become short-circuited, the needle would drop to an extent depending on the scale value of the cells cut out. If the pointer does not remain steady on that point of the scale representing the voltage while the car is in operation, look for the trouble at once and remedy it.

What the Ammeter Reading Signifies—The operator having also familiarized himself with the significance of the ammeter indications, a glance at it shows whether there is a normal flow of current through the coil. Any departure from normal conditions, in fact, any change in the circuit that causes a variation in the quantity or volume of current flowing through the coil, is shown and can be accounted for by the behavior of the ammeter, whose indications serve as a reliable guide in locating ignition troubles. Poor contact is shown in a diminished current flow; too small a gap between the vibrator or spark points is indicated by an abnormally high reading; and a short circuit at the spark plug, due to soot or breakage, will cause the needle to be thrown to the extreme point of its movement. A loose connection causes oscillation, while a broken wire is indicated by stoppage of the engine and zero reading of the ammeter. Study of the accompanying table will give some idea of the extent to which the voltammeter can be made of service in detecting ignition troubles.

As to the durability of the instrument when permanently attached to the car, and therefore subject to constant vibration, it may be said that a distance of more than 20,000 miles has been covered without recalibration or repairs. The cost of cleaning, adjusting, and recalibrating one of these instruments probably would never exceed $2.00. As with watches and clocks, however, to insure long life and accuracy, the instrument should be sent back to the manufacturers once a year to be checked up, or calibrated, and to have the bearings readjusted if necessary. The ordinary owner, driving his own car, should never attempt this.

TABLE OF COMMON IGNITION TROUBLES AND REMEDIES

Reading of Voltmeter	Corresponding Ammeter Reading	Cause	Remedy
Steady.....	Regular.....	Normal conditions.....	None necessary.
Oscillating needle.	Irregular.....	Loose contact in battery circuit—Leakage of secondary current—Short circuit or exhausted cells.	Tighten connections—See that timer contact is made evenly—Eliminate leakage.
Uniform or gradual drop.	Regular.....	Normal deterioration of battery.	None required.
Abnormal drop.	High.....	Rapid deterioration of battery because of short circuit at plug or in battery box—Improper adjustment of coil-vibrator or spark, plug gaps, latter being too narrow—One or two exhausted cells.	Eliminate short circuit—Readjust vibrator and spark gaps—Remove exhausted cells.
Normal....	Low.....	Poor contact in timer, vibrator, or connections—Short circuiting of cells.	Clean contacts, eliminating effects of corrosion or wear.
Normal....	High.....	Sooted spark plug—Gaps at vibrator or spark plug too small—Decreased coil efficiency.	Clean spark plugs—Increase width of gaps—Readjust tension of vibrator spring.
Normal....	Irregular.....	Poor timer contact.....	Fix timer.
Normal....	Zero.....	Broken ground wire.....	Put in new wire.
Zero.....	Zero.....	Broken wire between coil and battery or broken battery connections.	Put in new wire.

APPLICATION OF HEAT TO THE MIXTURE

While it is true that the rate of flow of liquid gasoline will increase with increasing temperature of the liquid, and even considering the fact that if heat is not applied to the liquid it will not vaporize, these considerations do not alter the vapor condition and the performance of the mixture in route to the motor, from the carbureter. Since automobile gasoline is a composite of several fractions of the hydrocarbon, and since all of the fractions do not hold to the same volatility, it is advantageous to prepare the mixture, in route, with the idea of affording the best results. If heat is applied to the mixture after it leaves the carbureter, the less volatile fractions will be more or less vaporized, and the performance in the combustion chamber will then be superior. It may not be possible to vaporize some of the heaviest contents, but it is fortunate, perhaps, that the percentage of such fractions is low, relative to the whole content. In the meantime, what is wanted is a means of supplying the right number of heat units, at some constant desirable temperature, rather than a limited amount of highly heated air, as is sometimes the practice. The practice of furnishing heat at the point of vaporization is also gaining in favor, daily.

WIRE-DRAWING IN CARBURETERS LIKELY

Frequently it is observed that the intake to the carbureter is so restricted that noise issues and a little further investigation in such cases will disclose, in all probability, that wire-drawing is one of the ills. It is not alone the noise that is objectionable in such cases; the power of the motor will be less, due to the restriction which has the effect of reducing the weight of mixture that enters into the cylinders, and the power of a motor is undoubtedly proportional to the weight of mixture that enters the cylinders, assuming, of course, that the same is in acceptable form and that it is completely burned. True, there must be a depression in the carbureter in order that there will be a difference in pressure, so that gasoline will be sucked into the train of air; equally true, it is of the greatest importance to have the depression as low as possible in order that the power of the motor will be a maximum. If the depression is but slight, provided the carbureter is properly designed, the amount of fuel entrained will be adequate for the purpose. If, on the other hand, the depression is very large and holds considerable fuel, it will soon be found to be wasteful of the liquid. This large depression is the base of the modern "puddle" type of vaporizer.

54 ENTRIES IN FRANCE'S COMMERCIAL VEHICLE TESTS

By W. F. BRADLEY.

PARIS, Sept. 8—Fifty-four commercial vehicles of all classes have been entered for the month's reliability tests, to commence October 15 and end November 15. The importance of the trials, which are organized by the Automobile Club of France, has been very much enhanced by the assistance of the government. There are two distinct sets of regulations for the single competition, one being drawn up by the Automobile Club of France and the other by the War Department. All vehicles fulfilling the requirements set forth by the military authorities can claim a military subsidy of a rather important nature. Any purchaser of the type of vehicle approved of in these tests can enter into an agreement with the Government whereby on presentation of his automobile once a year and an agreement to sell on prearranged terms in case of war, he can claim a subsidy of $600 on the purchase of the vehicle and $200 on each of the three following years. Thus he will receive $1,200 within a period of four years.

This is the first time such an arrangement has been made, the Government having previously encouraged commercial vehicles by giving a few prizes in the Club's competition and purchasing two or three of the most successful vehicles. The new system will be beneficial to the manufacturer because of the impetus it is likely to give to trade. Many firms that at present stick to horses will be induced to adopt mechanical traction in view of the Government subsidies. It is not surprising, therefore, that most of the fifty-four vehicles are taking part in the tests under the army regulations.

There are three distinct classes in the competition, consisting of trucks, road trains and omnibuses. The trucks are subdivided into five distinct classes, beginning with vehicles carrying from 880 to 1,320 pounds and ending with heavyweights taking more than a three-ton load. The road trains are divided into three classes for traction engines, trains having several trailers for goods, and trains having several passenger-carrying trailers. The omnibus section has also three classes of, respectively, 6 to 10 places, 11 to 20 places, and more than 20 seats.

The headquarters of the competition has been fixed at Versailles, eight miles to the west of Paris. Here a large shed has been built, capable of housing sixty automobiles, with a private box for each, electric light, telephone, central heating, etc. There is a large covered courtyard for the washing of the vehicles, and sufficient room for all of them to proceed to their private boxes without hindering or in any way handicapping the others. The large amount of fuel necessary for such a fleet of automobiles will be stored in a separate building, the roof of which is double and about one foot apart. The space between the two layers of planks is filled with sand. Thus if the building caught fire, the lower roof, on being burned, would allow the sand to fall onto the fire below. The same system has been adopted for the central hall in which the automobiles will be housed.

Commencing Monday, October 18, the commercial vehicles will make daily journeys from Versailles, through the surrounding country and home to their garage, after having covered about ninety-five miles. As the country around Versailles can provide all kinds of roads, from rough pave to perfect macadam, and from level stretches to grades of 12 per cent., everything that is necessary to test the vehicles is at hand. On October 20, however, a longer journey, in four stages, will be made to Clermont-Ferrand, in central France. After one day's exhibition, a return will be made to Versailles by stages of about 90 miles, and from then to the end of the competition the daily trips out of the once royal city will be continued.

Under the military regulations the vehicles will have to make several of the journeys in convoys, at a speed set by the officers, and with a determined distance between each unit of the procession. Fuel allowed during the contest is gasoline, benzol and carburetted alcohol, for all three of which consumption will be controlled. The final classification is based on economy of operation per ton mile and regularity of running.

The firms entered in the competition, most of them having several vehicles, are Lorraine-Dietrich, Berliet, Krieger, De Dion, Saurer, Delaugère & Clayette, Berna, Peugeot, Panhard-Levassor, Clement, Malicet & Blin, Desmarais & Morane, Schnieder, Cohendet, Vinot & Deguingand, Aries and Société Francaise de Constructions Automobile.

France's Motor Plowing Match

PARIS, Sept. 8—At present only three firms are entered for the motor plowing match to be held in conjunction with the Amiens agricultural motor exhibition at the end of this month. The firms are the Compagnie Internationale des Machines Agricoles (the International Harvester Company's products), Vermond & Quellenec and the Société Generale de Moto Culture.

The competition is intended to show the most suitable type of motor-driven plow by putting them to work under conditions that are as near as possible a reproduction of those pertaining on a farm. On each of the two days that the test lasts the motor plows must turn over, under predetermined conditions, not less than two and a half acres of land. Fuel, water and oil required for the test must be taken in advance to the field to be worked and placed in suitable vessels, which will be sealed by a member of the committee. Tanks can only be filled from these sealed cans under the supervision of the committee, the plugs being sealed up again as soon as the supply has been taken. As economy of working is the basis on which the awards will be made, these precautions are necessary.

Work will begin at 7:30 a. m. on each of the two days, will be interrupted for one hour and a half for lunch, and carried on until 4 o'clock. While in the field no one but the operators will be allowed to touch the motor plows, and no fuel can be taken out to them except under the control of the committee.

TESTS OF GAS AND ELECTRIC LIGHTS

The headlight tests conducted by the Royal Automobile Club in London afforded an excellent opportunity to compare acetylene and electric lamps, as both of these types were well represented. The entries included 23 acetylene lamps, 8 electric, one kerosene, and one oxygen-gasoline. The electric lamps had an average candle-power of 24.2, and an average current consumption of 0.88 watts per c.p.; however, one lamp, entered by Vandervell & Company, gave 33 c.p. on 22.3 watts, at the rate of 0.68 watts per c.p. The acetylene lamps averaged 20.8 c.p. on a consumption of 0.037 cu. ft. of gas per c.p.-hour. In the opinion of the judges of the test, ample illumination is afforded by a lamp of about 20 candle-power, which should be obtained on a consumption of 0.75 cu. ft. of gas (about 3 ounces of calcium carbide per hour) or 18 watts. This estimate, of course, presupposes efficient optical arrangements. Two headlights, two side lamps and a tail-light could therefore be run on rather less than 60 watts, which, allowing an efficiency of 75 per cent. for the dynamo, would take but one-tenth of one horsepower. A 6-volt, 60-amper-hour storage battery would run such a set of lights for six hours on one charging. The summary of the tests showed that with a given lamp the best results were obtained when the lamp was placed at a height of either two feet or seven and a half feet (as when on the roof of a closed car). When the lamp was placed at a height of three or four feet, a downward inclination made the dazzle worse. The worst of all positions tested was that with a height of five feet and no inclination; with the lamp in question the object was visible only at 22 feet. With the same lamp at a height of two feet and inclined five degrees downward, the same object was visible at 64 feet, the superior range being due to lessened height.

VULCANIZERS—THEIR WORK

Editor THE AUTOMOBILE:

[2,013]—Will you give me some information on the process of vulcanization? Are any of the gasoline vulcanizers practical for an automobile owner to use? Also, in the matter of acid (what acid?) cure, is this, in any way, injurious to the tire, and if so, to what extent? Is it a practical thing for an outside shoe? In fact, any information whereby automobile tire troubles may be lessened or remedied will be very welcome.

Nichols, Conn. W. T. K.

The process of preparing rubber to be used in the form of tires is not a long one, nor is it complicated, consisting of but a few steps. The crude rubber is cleaned, sulphur added to it and then baked into a unit by the application of heat. The cleaning process is called curing, and it is in this part that the acid is used. A rather long extract from the description of the whole process is given below. This, we think, explains the whole process in details sufficient for any one not a rubber expert.

Crude rubber, which is to be used for industrial purposes, is first subjected to a very thorough cleaning process. The fact that it is rendered plastic by heating, and that it retains the form given to it in this state at lower temperatures, facilitates its working. The working processes consist in cutting, rolling and kneading. The crude rubber is first laid in water for some time and is then cut by a constantly wetted, rapidly rotating circular cutter, into pieces of different sizes. The rubber chips thus obtained pass from the cutting machine between two rollers which turn at unequal speed and deliver a continuous brown-colored strip of rubber. By means of special kneading machines or masticators and rollers, the purified rubber is worked up into a homogeneous mass and is then dried. Frequently two closely spaced rollers are used, which are heated from the inside and rotated at equal speed. The main factors affecting the most important uses of rubber are the influence of temperature changes on its elasticity and its limited resistance to chemical agents. These weaknesses must be almost entirely eliminated by vulcanization; that is, the treatment of rubber with sulphur at a high temperature. This process consists in mixing rubber with from 8 to 20 per cent of sulphur, and at the same time with other desired ingredients, such as zinc sulphate, lithophone, talc, magnesia, chalk, etc. By means of rollers and kneading machines this mixture is first worked up into a homogeneous mass and is then heated. Of the admixed sulphur from 1 to 2 per cent is chemically united with the rubber, while the rest is either evaporated or remains as a mechanical admixture in the rubber.

The heating of the rubber sulphur mixture is one of the most difficult processes in rubber manufacture, as too high a temperature easily produces a horn-like substance, and if the temperature is too low, the process must be repeated. It is usual to work at between 110° to 140° C., and to continue this temperature for a time depending upon the mass worked upon. The most practical method of heating consists in the use of special steaming apparatus, cylindrical cauldrons, which are heated by steam and closed in front by a gas-tight cover. These contain inside wheeled trucks for the reception of the articles to be vulcanized. In order that there may be no change of form during the heating process the articles are placed in forms which are strewn with talc to prevent them from sticking. Heavy sheets of rubber are laid between iron plates; these layers are wound with layers of fabric on a drum. Fabric is vulcanized between heated rollers, driving belts in a heating press, etc. Instead of sulphur, sometimes other substances are used for vulcanization, such as the sulphur compounds of antimony, barium, calcium and lead. Rubber articles are given a red color by means of sulphur antimony and a white color by means of lithophone, magnesia, chalk, etc.

Another authority gives the range of vulcanizing temperature as between 130 and 150 degrees C., which is equivalent to from 266 to 302 degrees Fahrenheit. Still others specify different quantities of sulphur. Thus it is that experts agree on many of the details, but the main process as outlined above does not differ greatly.

The ordinary owner and operator of a car only uses the vulcanizing process to unite new pieces of rubber, such as patches, with the older and vulcanized, therefore different, rubber of the tire. The use of the vulcanizer is necessary to do this work in a proper manner, and one that will hold, just as if the two, the old tire and the new patch, were an integral part of one another. Aside from this, which amounts to making repairs in a proper manner, the average owner has no use for a vulcanizer nor for the process. The purchase and use of one, however, is a very desirable thing, since it enables the owner to attend to his tires at the first sign of trouble, and attend to them in a proper manner. In this way small and apparently insignificant cuts may be repaired before they grow and develop into large and unsightly wounds which may not be cured. This will result in prolonged life and increased mileage for the tires, which in turn reduces the cost of motoring per mile. This latter would be sufficient in the course of several seasons' driving to more than make up for the initial cost of the vulcanizing outfit.

GARAGE FLOOR CLEANER

Editor THE AUTOMOBILE:

[2,014]—Will you please inform me of something that I can use to clean the floor of a private garage, something that will remove oil and grease, and can be applied with the hands and not do them any harm.

New Rochelle, N. Y. B. GULLE.

A hot saturated solution of common washing soda will do very well. This can be made up in quantities and stored against future use. If this method is used, be sure to reheat it before using, the boiling point being about right. Since that will be too hot to apply with the hands, use any old broom or brush to "slosh" it around on the floor. An equally good, if not better, solution to use for this purpose is trisulphate of sodium, marketed by several chemical companies and sold at from four to five cents per pound at retail. This can be used cold and will not injure the most delicate hands; on the other hand, it will clean them very thoroughly, so that users of this solution use it for the hands as well as for the floors. This is strong, however, and may be used to remove paint.

The hands can be cleaned very thoroughly by the use of a mixture of soap powder and powdered pumice stone, the exact proportion varying with individuals, which proportion is soon determined by any one using it. For this reason the mixture, being indeterminate, it is not advisable to make up very much at one time.

GRINDING HUM OF GEARS

Editor THE AUTOMOBILE:

[2,015]—I have a * * * * * * Model F car; can you inform me through "Letters Interesting, Answered and Discussed," how I can eliminate that grinding hum from the gears? I have adjusted the differential gears both ways, but it seems to make little difference. J. C. BALL.

Kalamazoo, Mich.

This is a kind of trouble that we have never heard of as applied to this particular make of car. If it were the engine gears you might help it a little by substituting a fibre or rawhide gear for one of the intermediates, this usually sufficing to take out all humming and whirring noises.

You do not say what gears are at fault, but from the mention of the differential we suppose that you have reference to the transmission gears. Try the use of a different lubricant—that is, if you are using oil, resort to grease, and if using grease, try heavy oil. The writer has had unusual success with a combination of oil and grease for transmission gears, although none of the experts seem to think that this is right. The oil experts advocate oil at all times, while the firms making grease say that this should be used early and late, to the exclusion of everything else. It will not be possible to make the substitution spoken of above in the transmission, so you will have to look for looseness, and, failing that, experiment with oils, greases, and other lubricants until you obtain a noiseless lubricant, or one that will render your gear box noiseless.

PREFERS LIGHT OIL

Editor THE AUTOMOBILE:

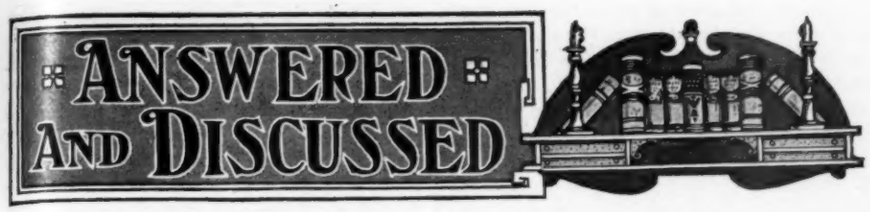
[2,016]—H. L. Towle's article in your issue of August 19 contained an idea that I have always maintained, regardless of the manufacturer's instructions, to use a light oil when a transmission contains a plain bearing, and one that I find is seldom used.

Out of six Franklins that have come under my observation, one, and that the one I have been driving, have used a light oil, in fact, my transmisison has never had anything heavier than Zeroline, the others using anything from dope to 600 W oil, with a result that instead of using from one to four bronze bushings inside of the main driving pinion within 10,000 miles, my car has better than 35,000 miles with practically no indications of wear at this point.

This result, I believe, would confirm the statement that "if there are plain bearings to be lubricated * * * * oil is almost invariably essential."

Billings, Mont. MURRAY B. FRENCH.

By "dope" the writer above means a mixture of oil and grease which is neither the one nor the other, being liquid at times and solid at other times. The writer has used this combination with the best of success in heavy truck transmissions, in which there were but four plain bearings on the differential, all of the transmission bearings being radial ball bearings or plain (not tapered) rollers.



WANTS HAND TIRE PUMP

Editor THE AUTOMOBILE:

[2,017]—Will you please ask some of your advertisers to give information, through the columns of "The Automobile" or "Letters Interesting, Answered and Discussed," where I can obtain a good, efficient hand air-pump that will readily put a pressure of 100 to 125 pounds into a tank in the garage, on which (the tank) a pressure gauge is permanently attached, making it possible in this way to fill a tire quickly and accurately? The value of such an outfit is in knowing exactly what the pressure is instead of guessing at it—and always guessing wrong when in a hurry. The pressure in the tank can be restored at odd times and maintained for ready use. A piece of pipe 8 or 10 inches in diameter and 10 feet long makes a good air reservoir.

Lima, O. C. F. LUFKIN.

The scheme outlined above is a good one, if any garage cared to follow it, but a much better one would be to have a power pump to fill the tank. This will not only pump the tank up quicker, and more surely, but the useless and exhausting physical labor connected with pumping against say 100 pounds pressure will be eliminated. With a power pump, there would also be no necessity to use so small a reservoir, the size in the suggested case being doubtless governed by the ability of one or several men to fill it and maintain the pressure within it at all times.

For the larger tanks, numerous makers of such outfits advertise in THE AUTOMOBILE, which statement is also true of power pumps. Since there is very little call for large-sized hand-pumps, very few of them are made or advertised. Doubtless, any one of the hand-pump makers would be glad to make up one on a special order. This would, however, be very expensive.

Another point to which attention is called in this connection is that with the power pump the garage man need not confine himself to the pressure stated above, 100 to 125 pounds, but can have from 150 to 200 pounds or higher if desired. This is worth considering with the modern tendency to larger tire sizes, which should, of course, have greater pressure. Thus, 95 pounds is recommended for a 5-inch tire; probably 110 would be about right for a 5 1-2-inch tire. At that figure, a single set of four 5 1-2-inch tires would exhaust the tank as suggested above, with pressure at 110 pounds.

CARS IN VARIOUS COUNTRIES

Editor THE AUTOMOBILE:

[2,018]—Will you please give me an approximate idea of the number of automobiles in use and the number produced in the past year in each of the following countries?

Denver, Col. R. H. HEAD.

Anything of this sort is always in the nature of a guess, except in the case of England, where it just happens that the Royal Automobile Club has compiled very complete and exact figures on this subject. France, too, can be given rather closely for a census was taken there, but as to this country and Canada it is only a very broad estimate. The figures follow:

	Total in Use	1909	Remarks
United States.	200,000	80,000	Also 50,000 motor cycles
England	90,000	30,000	Also 65,000 motor cycles
Germany	21,000	5,800	Also 20,900 motor cycles
France	43,600	6,000	
Canada	3,000	500	

WINTER COOLING MEDIUM

Editor THE AUTOMOBILE:

[2,019]—Will you please advise me through "Letters Interesting Answered and Discussed," what would be the objections to using a very light oil for cooling as well as lubricating during the winter months. I have a Model T * * * * *, which is one of the early 1909 models and has a pump. Or, if you would advise against using the oil for cooling purposes, what would you advise using when the daily temperature is very low, around 30 below for weeks at a time in winter? E. W. J.

Norway, Mich.

Oil is very good for this purpose and if properly used, will raise the efficiency of the engine. To obtain this, you must select an oil which has a very low freezing point as well as one which is known to possess the peculiar quality of stiffening up very little under very low temperatures. Such an oil is marketed and sold for use with refrigerating machinery, and is known as refrigerating oil. In using oil, the supply need not be very great, that is, it is not as important as in the case of water, which is liable to steam away, in time. If for any reason, you could not obtain a proper oil, any oil picked up at random could be used, but would require a lot of care. Some prefer the use of alcohol or alcohol and glycerine. With the former a temperature of 30 below can be safely used, while the latter is more serviceable for slightly higher temperatures, minus 15 being its limit. The following table shows:

Alcohol	
Per cent by Weight	Freezing Point Fahr.
25	-3
30	-9
35	-16
40	-25
45	-36

GARAGE PLANS AGAIN

Editor THE AUTOMOBILE:

[2,020]—Will you please advise us whether you have published or any of your advertisers have offered plans of garages in the columns of "The Automobile."

Coatesville, Pa. C. R. & CO.

We have in preparation an article on the subject of garages, in the course of which plans of a number of private ones will be given, as was suggested in our reply to Letter 1,985 in the August 19 issue. This article will begin in an early issue and will run through several copies, all phases of the private garage being discussed.

HOW TO FIX CARBURETER

Editor THE AUTOMOBILE:

[2,021]—Will you please tell me why my two-cylinder engine, size 4 1-2 by 5, will not start on one or two crankings? I am positive that everything is all right. Occasionally it goes off on first turn and then again, under some conditions, I crank until red in the face, without results, especially in cold weather. The carbureter is a 1 1-2-inch * * * set between the two cylinders, with easy rounding curves in the pipes, on a level with the bottom of the cylinders. If I put gasoline in the priming cock, it will start on the first turn every time. The compression is good, as the valves have just been ground in. I have a 6-60 storage battery, the gasoline is 65 degree, and after starting the engine runs elegantly and has plenty of power, opening or closing the throttle making very little difference.

E. St. Louis, Ill. HARD STARTER.

From a perusal of the facts in your case, it would seem as if the trouble is in the level of the gasoline in the carbureter at starting, that is, the fuel level is such that not enough of the liquid flows into the mixing chamber in normal position. To remedy this, lower the nozzle so as to raise the level comparatively, trying 1-32 inch for a starter. This will cause more liquid to rise in the standpipe or nozzle, which will allow easier starting. To compensate for the extra fuel supplied in running, it will be necessary to allow the auxiliary air valve to open more than it does now. This, however, you will find out by trial after you have made the change in the nozzle level.

This same subject has been treated at various times in the past in different ways, and you are referred to the previous letters on the subject. These are: Letter 1876, May 13; letter 1910, June 17; letter 1940, July 15; letter 1952, July 22d.

Although there are no symptoms of trouble there, it would be well to overhaul your ignition system thoroughly at the same time.

LONG STROKES—MARINE USE

Editor THE AUTOMOBILE:

[2,022]—In the May 13 issue of "The Automobile" I noticed mention of a new French automobile engine (or, possibly, an airship engine) which had a rotary valve in the head and an unusually long stroke compared to the bore. The bore was about 4 inches and the stroke 9 1-2 inches. I would like to ask if this proportion is applicable to marine engines of the multiple cylinder type, with any prospect of success or advantage over the engine with bore and stroke more in keeping with the usual standard, say 4-inch bore and 4 to 5-inch stroke. G. W. TYRRELL.

Perth Amboy, N. J.

The use of a long stroke and the advantages appertaining thereto are available for any engine whatever, regardless of number of cylinders or purpose for which the engine is to be used. For marine use, however, it has an unusually applicable feature, that is, the long stroke motor delivers power at the slow speeds which are nearly always used in marine screws. This would eliminate gearingdown, as is necessary with a short stroke, high-speed engine, or its usual equivalent, throttling the engine, which reduces the power very materially. The latter is believed to be one of the reasons why the rating of marine engines is so small for equal bores as compared with automobile engines, that is, the makers appreciate that at the slow speeds used in marine work the engine

will not deliver much power, and consequently rate them very low.

This is very apparent in the rating of any well-built marine engine, of which a single instance will suffice. One well-known maker builds among others three engines with a six-inch bore and seven-inch stroke. These are made in two cylinders, rated at 14 horsepower; four cylinders, rated at 28 horsepower, and six cylinders, rated at 42 horsepower.

With equally good material, workmanship, and construction, automobile engines of these sizes would rate according to formula at 28.8, 57.6, and 86.4 horsepower, respectively. But a manufacturer making an engine as large as any one of these would rate it higher, so that an average rating for these would be say, 33, 67, and 100 horsepower. The difference between the latter figures and the actual maker's rating for marine service is the difference between a speed of say 350 revolutions per minute, the maximum for marine use, and possibly 900 r.p.m. as the speed at which the engine might be run in an automobile, if it was desirable.

Now, these figures represent the power from an engine "more in keeping with the usual standard" as you have aptly put it. For a long stroke, which in this particular case would be anything from 9 inches up, the rated amount of power would be developed at a much slower speed, and at the rated revolutions, 350 per minute, more power would be produced. The engine in question (Anzani) had a ratio of bore to stroke of 1 to 2.56. This ratio applied to the engine in question would give it a stroke of 15.36, or to make it an even figure, 15 inches. That size of engine, 6 by 15, would deliver power more nearly like the automobile rating and accomplishment than like the ordinary marine engine, and that, too, at the speed of the marine power unit, namely, 350 revolutions per minute.

To show this matter to the lay reader in as simple a manner as possible, the accompanying curves have been plotted. This represents the imaginary curves of a six-cylinder engine for various lengths of stroke plotted upon the same ordinates as an actual power curve of a 4½ by 5½-inch engine. Six lengths of stroke are shown varying from 3½ inch up to 8½ inch all for the same 4½-inch bore. The former represents a ratio of bore to stroke of 1 to .78 and the latter, 1 to 1.89.

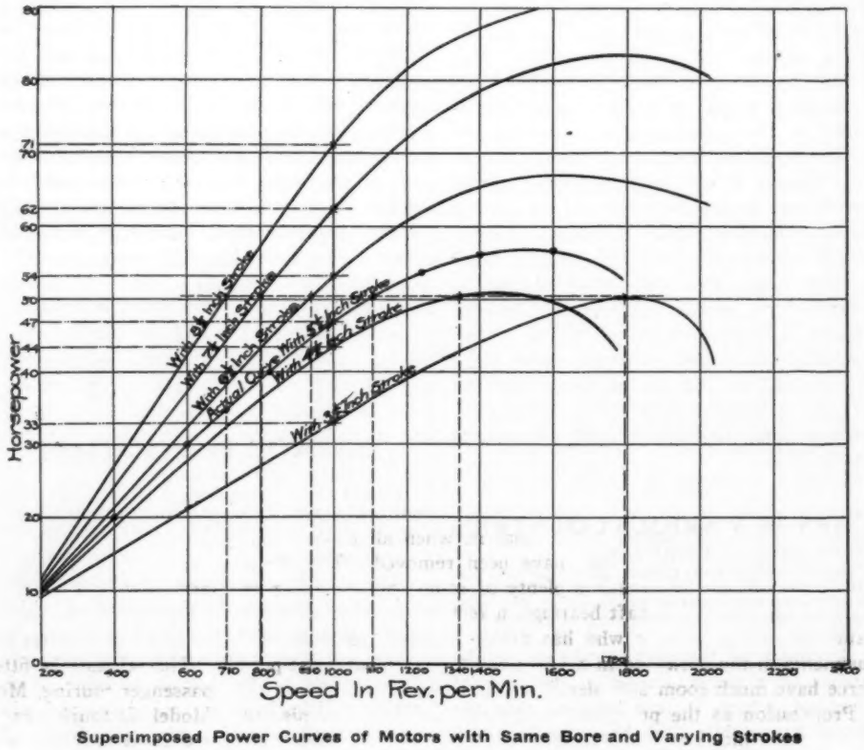
While these curves are imaginary, they are based upon accurate knowledge of what engines of the various strokes would do as exemplified in various special motors built abroad and at home. Attention is called first to the flatness of the curves of power for the shorter strokes, which gradually decreases until the line of equal bore and stroke is crossed, beyond which each curve is more steep and has less sign of a flat top or maximum point than its predecessor. Thus, the curve of the very short motor, 4½ by 3½, shows a very marked peak, at which the maximum power is developed, this being the only point at which that power is developed, the output increasing gradually but very slowly up to that point, and falling off very sharply beyond it.

With the longer strokes the falling off becomes less marked, until with the longest stroke, 4½ by 8½, there is nothing of this sort to be seen, the power increasing very markedly from the start of the test up to the maximum speed recorded, its steepness at this point being such as to lead one to the supposition that testing at a higher speed would continue to yield more and more power. Data are available for a motor of smaller bore, yet of comparatively the same ratio of bore to stroke, which continued to yield increasing power in about this ratio up to 2,400 revolutions, at which point the steepness of the curve had changed very little from that obtained at 1,500 revolutions.

Attention is, moreover, called to the speed and power as there depicted. Thus, taking any speed at random, let us see what power will be developed at the different speeds. At, say, 1000 revolutions, the 3 1-2-inch stroke motor gives but 33 horsepower, the 4 1-2-inch stroke 44, 5 1-2-inch 47, 6 1-2-inch 54, the 7 1-2-inch 62, and the 8 1-2-inch 71. If the square motor be taken as a standard, these results mean a loss of 25 per cent in the short motor, and the following gains in the longer strokes: 5 1-2 6.8 per cent.; 6 1-2 22.7 per cent.; 7 1-2 41 per cent.; 8 1-2 61.5 per cent.

At a slower speed the differences are even more marked, as, say, 600 revolutions. At this low speed, the 3 1-2 stroke develops 21, the 4 1-2 28, the 5 1-2 30, the 6 1-2 32, the 7 1-2 37, and the 8 1-2 43. In percentages these do not surpass the other figures, but considering the additional value of pulling power at slow speeds, the gain in the case of the three longer strokes of 14.3, 32.1, and 53.6 per cent. power over the square motor is of greater worth than the higher percentage of gain at the increased number of revolutions.

To compare the power output in another way, select the varying speeds at which some one power would be developed, as, say, 51 horsepower. This is only developed in the 3 1-2-inch stroke motor at the very high speed of 1,790 revolutions. Anyone could tell that in this the speed of 1,340 necessary to develop this power with a 4 1-2-inch stroke was a marked superiority. The same is true, but in a more marked degree, with the increased lengths, as exemplified by 5 1-2 1,110; 6 1-2 930; 7 1-2 805, and 8 1-2 710. To make the point more apparent, select a slightly higher power, as 52 horsepower. The two shorter stroke engines will not develop this at all, while the 5 1-2 stroke does it easily at 1,130 revolutions, the 6 1-2 at 950, the 7 1-2 at 820, and the longest stroke, 8 1-2 at 725. The selected facts and the diagram, itself, will at least afford some study, enough to more than pay for the time and work of making it. Anyone having in his possession actual and accurate tests of six-cylinder engines of this bore, 4 1-2 inches, and strokes differing from the one actual curve, 5 1-2-inch stroke, is invited to send in the figures. Or, curves based on accurate tests of four-cylinder engines, will be equally valuable and accepted as gladly.



Superimposed Power Curves of Motors with Same Bore and Varying Strokes

THROUGH ENGLAND'S HEART WITH AN AMERICAN CAR

By J. P. H.

TO spend only a week or ten days on a motor tour of England is like rushing through the Louvre or the British Museum with catalog in hand and only stopping long enough before each picture to tick it off, and then passing on to the next, just to say one has seen it. Still, one can crowd a lot of pleasant sightseeing even into a brief period, as E. S. Partridge, of New York City, and his friends discovered when they recently made a flying tour in a 60-horsepower Stearns car.

Leaving London by the only straight road out of town—a relic, by the way, of the days when the Romans were building roads in England, and built them straight—the first place of interest is St. Albans, probably the oldest cathedral town in Great Britain. The ancient structure, restored some years ago, stands a little off the highroad, and the merest glimpse of its square tower is all that is available in passing.

Here begins the famous coaching road known as the Holyhead road, on which the Irish mails used to travel in the days when railroads were unknown. It is still a fine, smooth road, with glorious spreading meadows on both sides, dotted here and there with a field under cultivation. Through Dunstable, Towcester, Daventry, we come to Dunchurch. Coventry, the home of the British motor car—not to speak of Lady Godiva and a few other celebrities—is only a dozen miles from Dunchurch. Here the Daimler cars are made; the managing director is an American, Percy Martin, who has introduced many American methods.

The beaten track past Coventry is through Warwick and Worcestershire, otherwise "Shakespeare's Country," but, unfortunately, the imperative duty of making a call upon relatives in the city of his birth, compelled our skipper to steer the Stearns on the broad highway from Coventry to Birmingham, the Chicago of England. Two days' rest in "Brummagem" and we were once more on the wing for our flying trip through the heart of England. Heading northwest for our next destination, Nottingham, we are reminded of a bit of ancient history as we pass through Ashby de la Zouch, the scene of the famous tournament which Sir Walter Scott has immortalized in Ivanhoe. But the worst of a motor tour, especially where you want to get over a lot of country, is the way one has to skip these interesting places, even though you may make a mental reservation to come back some future day when you can stay a little longer.

E. S. Partridge and J. P. Holland at Brooklands

Much the same conclusion was reached on leaving Nottingham, where the road passes through Sherwood Forest, an enchanting spot with the branches of the greenest trees we ever saw meeting arch fashion across the smooth gravel roadway. Visions of Robin Hood and his Merrie Men, not forgetting old Friar Tuck, seem to flit among the shadows cast by the sunshine through the waving foliage. Our next objective was Doncaster, the only town in England where they are not ashamed to own that horse racing is a profitable game. Indeed, it is said that the profit on the Doncaster racecourse, which is one of the finest in the country, pays all the local rates, poorhouses, roads, municipal government and all the rest of it except the King's taxes for the central government in London. However that may be, certainly Doncaster looks prosperous enough.

The Great North road, which used to be the connecting link between England and Scotland, leads from Doncaster north to the ancient city of York. It is a magnificent road, and like all the best roads in this country, dates back to the days of the Romans. How those old warriors built their roads, which are still as smooth as city boulevards, although their edges are covered with grass mounds, the accumulation of centuries, is a marvel. To "open 'er up and let 'er go" is only natural on such a smooth stretch as this, and we should certainly have done so but for a little warning we had shortly after leaving Doncaster, which damped our enthusiasm for some time after.

Standing by the roadside was a man with a bicycle and a yellow armlet around his sleeve. As we approached him, our guide signalled to him, and in response he threw back the lapel of his coat disclosing a red disk of about three inches diameter pinned to his vest. The performance had an air of mystery.

"Police trap," exclaimed the guide, at the same time motioning to the skipper to slow down. Then he explained that the man with the red disk was one of the Automobile Association patrols or scouts. His job was to keep track of police traps. Where the road is clear he will notify passing cars that there is nothing to fear, but when there is danger ahead he shows the red disk. He had scarce finished this explanation when we saw behind a hedge two figures that looked suspiciously like plain clothes cops, and a little further along the road we came

Warwick Castle, the Ancestral Home of the Great "King Maker"

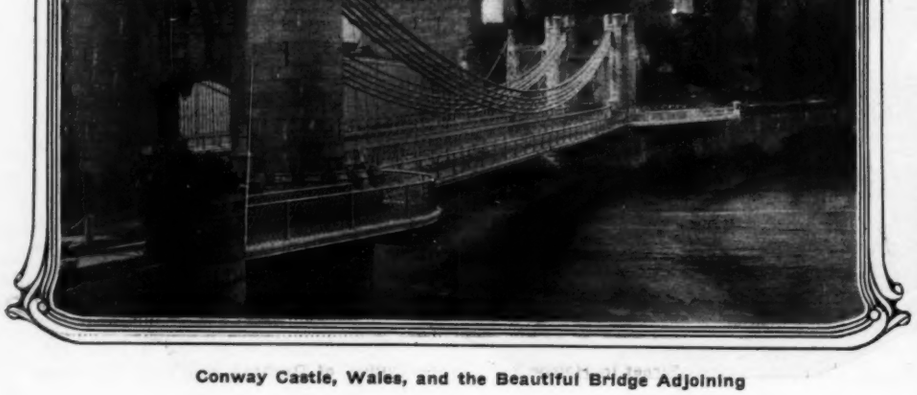
across a man in uniform who glowered at us as we passed at a fifteen mile an hour pace. The game of trapping motorists is, in some sections of this country, almost as profitable as horse racing in Doncaster.

To read English history in bricks and mortar one should visit Old York. Whatever induced the early settlers of Manhattan to dub their town New York is certainly a mystery, for anything more unlike the old city of that name it would be difficult to imagine. The ancient city walls, York Minster sooty with age, the old Shambles, Pettergate, Bootham Bar, and all the rest of the landmarks which centuries have left make York a museum of antiquities in which the modern street car, not to speak of our Stearns, seemed as much out of place as an ox team would be in Broadway, New York.

From Harrogate north to Bolton Abbey, one of the most picturesque ruins in England, the road was not exactly up to the standard of the great highways we had been traversing; in fact, all these old abbeys seem somehow to be sidetracked from the modern trunk highways, and, moreover, to be, many of them on the highest bit of ground for miles around. The particular peak on which Bolton Abbey stands, midway between Harrogate and Shipton, has a gradient of twenty-five per cent. in places.

Through Shipton and Settle an up and down road leads to Kendal, the front door of the Lake District. Getting into Kendal is a ticklish job by car to the man who enters for the first time, and especially if, as on this occasion, the roads be wet. Signboards by the roadside warn drivers that "This Road is Very Dangerous," meaning that unless one's brakes are in good condition the driver had better proceed gingerly on low gear. For a mile or so the winding tortuous road sinks and sinks at every yard till the foot-brake band begins to rebel at being called to act so often. Then just as you imagine you must have got to the bottom or thereabout, the road suddenly drops at a gradient suggestive of falling off a house, and before you know it you are in the narrowest, crookedest street since leaving London. This is Kendal. A mile or so of similar narrow alley, with an occasional open market place, where you pick your way among heaps of garden refuse and crowds of straggling market people, brings you on to the road for Windermere, the queen of England's lakeside resorts. Two days' rest here was altogether too brief to allow more than the fleetest glimpse of the marvelous beauties of this jewel of British scenery.

"When Knights Were Bold," one of the most amusing comedies of recent years, pictures the hero of the play suddenly awaking in the middle of the twelfth century, or, as he puts it, "seven hundred years behind the times." That is about how it felt next morning at Chester. The furniture of the hotel must have been centuries old, but one gets used to that sort of thing traveling around England. It was outdoors that we got the surprise. It had been just growing dusk when we arrived the night before and the fantastic shapes of the buildings did not particularly strike us. But coming out into the street in the clear sunny morning and suddenly finding oneself surrounded by buildings that look for all the world like the stage setting of a scene from "Henry V," well, it certainly did make us feel a bit stage-struck, if nothing worse. Even the British "Bobby," with his helmet and silver buttons, seemed a part of the show somehow. A stone's throw from the hotel was an archway crossing the street, which the "buttons" informed us was the old Town Wall. At his suggestion we investigated this relic at closer range, and found that we could ascend to the parapet by a stone stairway from the street, which we did, and had the satisfaction of walking half a mile on the old ramparts returning for breakfast at the hotel.



Conway Castle, Wales, and the Beautiful Bridge Adjoining

Then off and away from the earliest Roman camp in England, westward to Wales to the delightful watering place, Llandudno, nestling under the wall of old Conway Castle, an ideal spot for a lazy summer holiday. Thence direct south brings us into an enchanting country of woodland and valley, which grows wilder at every step until we reach a perfect

fairyland of fern-covered dells, dancing waterfalls, leaping rivulets, sheltered under moss-grown trees from which hangs a drapery of verdure which resembles nothing so much as old lace. This is Bettws-y-Coed. Of course it is Welsh, and so is Llangollen (pronounced Clangothlan), where we envy the lounging holiday makers who have time to stay to admire the beauties of this wonderful valley. Still we were glad even for the all too brief peep at this scenic gem of North Wales.

The Valley of Llangollen, a Scenic Gem in Northern Wales

There is one curious feature of traveling over England which has puzzled many people, and that is, the variety of dialects encountered. To attempt anything like a description of the many varieties is a bigger job than I propose to tackle. At the same time I think one can find some explanation of the variation when hurrying over the country in a motor car and noticing how the general appearance of the land seems to be echoed as it were in the lingo of the natives. Thus from Bath down to Exeter or Plymouth the main feature of the road was the high hedges on either side, making the roadway little better than one continuous green alley, through which the hum of our wheels reverberated as though another car was following us. In the same way whenever we accosted a native in these parts his talk seemed to be full of a buzzing sound that made it most difficult to understand. I don't know if this explanation is very clear, but if it is a bit obscure then it is only in keeping with the lingo I speak of, which was simply "thick."

Of the last day's run in this flying trip I must make short work. Through Exeter, Salisbury, Basinstoke, Bagshot, and through Windsor Forest we drove, arriving at Weybridge in time for the bank holiday motor races on the Brooklands track. Here we found many old friends and a fairly enjoyable afternoon's racing. During the course of the afternoon we were introduced to Major F. Lindsay Lloyd, the manager of Brooklands track, and our best persuasion was exercised to obtain his permission for a trial run of the Stearns around the track after the race was over. He, however, declared that much as he would like to grant the permit, it was absolutely impossible.

Leaving the grounds after the race was over, however, we had to cross the wide asphalt track. One or two cars which seemed to be going around the track proved a temptation not to be resisted, and the first thing we knew the skipper had turned Stearns' nose to the left and was headed with wide-open throttle for the big bend behind the grandstand hill.

Although we were five up, she responded like a grayhound to the call. Speed? You never know what speed means till you try to find it at Brooklands. Up and up the scooped out banks we crawled sideways as our car flew ahead, and then down into the straight nearly a mile long, and once again around a curve that simply adds momentum for the next mile straight. Over sixty for the first lap! And now we are just beginning to warm up. Round the big bend once again, higher up the bank this time and we dash into the straight. The asphalt ribbon rushes under us and a double-header railway train on the track above us is passed as though it were standing still.

But when we slowed down at the gate and Major Lloyd overtook us in his little car and said what he thought about our disobeying his express injunctions—well, it took all the pride out of us, and we offered to submit to any penalty he might impose for our disobedience. Certainly, the experience was cheap at any price short of confiscating old Stearns herself. And for anyone who wants to know just what a car can do and what it feels like to get every inch of speed out of a car, the journey across the ocean is worth while if it ends at Brooklands. But I would certainly advise them to get a permit from Major Lloyd first. He is one of the most genial of good fellows, and will strain a point to oblige a visitor. But when he says "No," he means it, and the applicant had better retire gracefully.

We cannot hope to rival England's charming rural scenes or the romantic and historical interest of her cities, but we can at least hope that some one will build us a Brooklands.

A Street in Holcombe Village—Typical of Devonshire

Grand Stand and Starting Point of the Recent Aeronautical Tournament on the Betheny Plain, at Rheims

CHAPIN BELIEVES IN AEROPLANE AS FUTURE INDUSTRY

PARIS, Sept. 8—After touring extensively in Europe, visiting many of the French and Italian factories, and being an interested spectator at the Rheims aeroplane races, Roy D. Chapin, of the Chalmers Detroit Motor Company, left Paris for London this week with the intention of sailing for New York towards the middle of the month.

Mr. Chapin was more impressed with the aeronautical movement in France than with the progress that is being made in automobiles.

"The French have reached a settled stage," he said to THE AUTOMOBILE representative, "whereas in America we are all alive on the automobile question and are making progress daily.

Paulhan in Flight at Rheims, Just Before His Accident

"In the matter of flying machines it is different. The Rheims week was a marvelous demonstration, fully proving, if any proof were needed, that the aeroplane is not a scientific toy, nor a passing fad for wealthy and idle sportsman. Flights were made there which showed the real value of the aeroplane as a means of locomotion. I feel certain that as the result of things they saw during the flying week at least fifty Americans will become the possessors of aeroplanes during the next twelve months.

"I am not inclined to believe, however, that there is any opening for an industry for the next four or five years. At present the aeroplane is a scientific and a sporting proposition. It is not, however, sufficiently developed to be independent of the weather and state of the land over which flights are to be made. Until it gets to such a state of perfection that it can go out in any ordinary weather it is not likely to be important as an industry.

"One of the most remarkable features of the movement is the attention that has been given to lightweight motors. There were some marvelous pieces of engineering on the aeroplanes at Rheims, one of the finest pieces of work being the seven-cylinder rotary Gnome motor used by Farman and Paulhan. It appears quite likely, however, that as the aeroplane progresses the necessity for specially light motors will become less and less. At the same time this does not diminish the value of the work done towards the lightening of motors.

"I am pleased that Curtiss won the Gordon Bennett cup for America, for it will waken up the country to the importance of flying as nothing else could have done. All the Wright flights with the exception of those at Washington have been done in secret, and the only other public flights have been those made by Curtiss down East. Thus the Middle West and the West have never had an opportunity of seeing an aeroplane, and quite naturally have never had much interest in them. The winning of the cup will change all this.

"Though we have no intention of jumping into the aeroplane business immediately—it is doubtful, indeed, if any American automobile manufacturer will do so—we are keeping a close watch on the flying movement. You can be certain that when the time arrives we shall not be the last to get into the swim."

Santos-Dumont Breaks Speed Record

SAINT CYR, FRANCE, Sept. 13—Santos-Dumont to-day made a cross-country flight of eight kilometers in about five minutes. His speed was at least 90 kilometers (56 miles) an hour. The machine was a monoplane weighing but 300 pounds.

BRITAIN BECOMES KEEN ON AERONAUTICS

LONDON, Sept. 8—The past four weeks have witnessed a surprising outburst of interest and enthusiasm in matters aeronautical throughout England. For some time there has been a growing feeling that the country was falling behind in a matter which was of supreme importance to it on account of its insular position, and this feeling has been brought to a head by the success of the recent Rheims aviation meet. Aero clubs are now in course of formation at all the important centers, and this bringing together of interested parties is bound to produce practical results in the near future.

So far, there are not more than a dozen complete aeroplanes in the country and only three or four have yet made proper flights. But of these Cody's machine must be ranked as equal to any of the foreign productions. No alterations have been made in the machine since the first successful flights three weeks ago. The latest performance was made last Saturday, when, after several passenger flights, a cross-country journey of eight miles was made. This was reliably timed to occupy 9¼ minutes, equivalent to a speed of 52 miles an hour. As the fastest performance at Rheims was the 48 mile-an-hour circuit of Bleriot, also on Saturday last, Cody seems entitled to the honor of record-holder. Doubtless an officially timed attempt will be made to decide the point.

There are several projects on foot for holding aviation meets over here, and the one most likely to materialize is that at Blackpool. The authorities of this enterprising seaside resort, noted for its motor meets in the earlier days, went as a deputation to Rheims, and, according to their report, sufficient promises of entries have been received to make success assured. Details have not yet been settled, but the date is likely to be during the second week of October, and the prizes will exceed $30,000.

The Aeroplane Club has also been endeavoring to arrange a meet at Wembley Park, only a dozen miles from the metropolis, but as a permit was never obtained or even asked from the ruling body—the Aero Club—it is unlikely that continental aviators will risk the suspension which would certainly follow their participation in an unauthorized meet.

Fortunately for the success of future meets, the Rheims contest has shown that it is not necessary to provide so extensive a track as was previously thought necessary, but that a circuit of three miles is ample. In view of this fact, the Brooklands authorities are clearing the large space within the track, and doubtless aeroplane events will soon figure on the program.

Timers' Stand and One of the Signal Poles at Rheims

Prizes for flights are becoming too numerous to mention. Some of these will serve a useful purpose, but others are impossible of realization and the action of the donors is to be deprecated. Of this nature is the prize offered by a London firm—obviously for purposes of advertisement—for the first flight across London. A twenty-mile flight across the crowded city would be accompanied by great danger to both aviator and the people below, and it is felt that steps should be taken to put a stop to these publicity dodges. Quite another thing, however, is the generous prize of $20,000 offered to the Aero Club by Baron de Forest. This is to be awarded to the aviator who flies the longest distance without a stop from any point in England to the Continent.

At the Rheims Tournament the Hospital Service and Emergency Equipment Was Complete in Minutest Detail

THE AUTOMOBILE

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HOW SHALL MATERIAL BE PROVEN

With the growing importance of metals in the modern chassis has come a call for more accurate and dependable information relative to the qualities and composition of the more common metals, as well as those of the highest grade. Engineers have asked: "Of what avail is it to use and pay the price for steel of 175,000 pounds tensile strength, when in service this metal yields but the equivalent of 150,000 pounds and in other ways does not behave as well as an apparently inferior material?"

So it was that the establishment of laboratories became rather general, these being confined mostly to machines for measuring the physical qualities of the material. As time passed, it was found out, by sad experience, that the metal would not always do the work claimed for it. The first impression was that the alloy steels had been overrated, and, laboring under this delusion, many manufacturers went back to steels of simpler composition. Others, more far-sighted, asked whether they were actually getting the chemical composition for which the claims were made and for which they were paying. This necessitated the establishment of a chemical adjunct to the physical laboratory.

While this second step forward brought results, several years of service brought forth many complex problems of a different nature, resulting in the necessity for other and widely differing testing machines. This is exemplified by the torsional machine, to measure torsional or twisting ability, a quality formerly neglected. Another is the machine to apply alternations of stresses, measuring and evaluating them at the same time. In this work experimenters came in contact for the first time with the century-old work and results of Wohler and Fairbairn, which were soon shown to be in line for revision and modernization.

Thus it was that the function of the laboratory underwent a change. From the former place where much money was expended, it became a place where money was saved. This resulted in its being given a more intelligent consideration, and a more prominent place in the factory, both as to location and as to personnel. To-day the tendency, as shown in an able article on this subject elsewhere in this issue, is toward the most importance for the laboratory and its resulting work.

AUTOMOBILES DEMAND ATTENTION

Not so many years ago automobiles were regarded as presumptuous intruders on the public highways, existing only on the suffrance of the other users. In England, until the passage of the "Motor Car Act," which only recently saw its tenth anniversary, automobiles had to be driven at a speed of not more than four miles an hour, preceded by a man on foot carrying a red flag. Holland, we believe, once seriously considered excluding them altogether. The day of such annoyances is by no means past; but now the great army of automobile users need not beg humbly for scattered favors. They can ask for their rights in a way not to be neglected.

The State authorities of Massachusetts recently instituted a census of road traffic as novel in form as it was commendable. The details and figures are given elsewhere in this issue. The results of this census, although not surprising to well informed and observant travelers, will be somewhat startling to those who have not been keeping abreast of the times in this respect. Briefly, the figures show that over one-third of the road users in Massachusetts are automobilists. Nor can it be said that this proportion is exceptional. Many will be found to assert that the same would be found true in every State north of the Ohio and the Potomac and east of the Mississippi. We can hope for no better fortune than that the authorities of these States will institute censuses similar to that of Massachusetts. Then the blindest cannot deny the conclusion.

One-third forms a very respectable minority. With such a weight of numbers the automobiling public with reason can demand certain reforms for which formerly it could but petition. First among our needs is a National Highway Commission, with such powers and appropriations as will enable it to give substantial aid in the building of trunk highways, as well as guiding and directing State constructions. Then we will have uniform State laws, abolishing arbitrary speed limits and compelling all road users to carry lights at night. Finally there will come National registration. Once Utopian dreams, these benefits lie now in the automobilist's grasp if he will but use the strength of his numbers. Organization is the source of all power, and clubs will now assume even greater importance.

HALF OF MASSACHUSETTS' TRAFFIC IS MOTOR-DRIVEN

BOSTON, Sept. 13—Preliminary figures from the data acquired in the recent road census taken by the Massachusetts Highway Commission reveal the remarkable information that 45 per cent. of the traffic over the State roads is motor-driven. Though well aware that the use of automobiles over the State roads had grown very rapidly, the Highway Commission was surprised to find that it made up so large a percentage of the total use of the roads, and it is now preparing detailed data covering the entire State.

The census was taken the week of August 22 to 28, and there were established 240 stations at which a count was taken for fourteen hours each day of the week. At a few stations also a twenty-four-hour count was made. All vehicles but bicycles and motorcycles were counted, and they were divided into six divisions, four for horse-drawn vehicles and two for motor-driven. The count was also kept in two-hour periods. When the census field work was completed the commission had nearly 1,700 cards, and these are now in the hands of its clerks, who are transferring the original figures to sheets, computing totals by districts, routes, and for the State at large, figuring averages and percentages.

The work is so complicated that in only one section of the State has it begun to approach completion. This division includes Essex, Middlesex and Suffolk counties and a part of Worcester and Norfolk counties, the area being the northeast corner of the State, north of Boston and east of Worcester. In that division there were 77 observers' stations, some of which were on the main routes of automobile travel, such as those of the North Shore, to Worcester, Lowell and Lawrence.

In advance of the official compilations, Secretary A. B. Fletcher, for his own information, took a few totals from this district, and his calculations gave the remarkable total of 45 per cent. motor-driven traffic. Out of a total of 24,019 vehicles counted in this district 10,622 were automobiles, which is exactly 44.4 per cent. This percentage may not hold as strong in the central and western parts of the State, or it may run higher; no figures are yet available for the other districts.

According to Mr. Fletcher, the heaviest traveled spot on State roads in the State so far discovered is in the city of Lawrence on the State road leading to Haverhill. At this station the observer counted an average of 2,440 vehicles each day of the week of the census, and one day nearly 4,000 vehicles passed his post. The numbers ran so high that the highway commission feared an error had been made, but investigation confirmed the figures of the observer. Of the average of 2,440 vehicles a day, 820, or 33.61 per cent., were automobiles. Another very heavily traveled place, where the ratio of motor vehicles to horse-drawn was just about the reverse of that at Lawrence, was discovered near President Taft's summer home at Pride's Crossing, North Shore. On the Shore road the observer counted an average of 1,611 vehicles a day, the automobiles averaging 976, or 60.58 per cent. of the total. At Weston Center, on one of the main routes to Worcester, the average number of vehicles was 990, and 38.59 per cent. were automobiles.

Much information of great value to the commission and to everybody interested in road maintenance is sure to be derived from the census figures, which, when wholly worked out, with deductions drawn therefrom, probably will be prepared in such form that they can conveniently be distributed. Another week's census of the State roads, and also of roads in the Metropolitan park and Boston park systems will be taken next month.

Up to the first of this month motorists had paid the State of Massachusetts this year in registration and license fees the sum of $151,635.52, this sum having been received by the State Treaurer from the Highway Commission and credited to the road maintenance account.

NATIONAL GRANGE GREATLY INTERESTED IN ROADS

MEMBERS of the National Grange evince much interest in the Second Annual National Good Roads Convention to be held in Cleveland, September 21-23, and several officers of the Grange will take the platform to help along the work. Ex-Governor N. J. Bachelder, of New Hampshire, present master of the National Grange, will speak on the opening day on "The National Grange and Good Roads." He will be followed by George S. Ladd, a special good roads lecturer of the Grange, who will speak on "The New England Plan for Connecting Lines of Trunk Highways." September 22, T. C. Laylin, master of the Ohio State Grange, will speak on "The Farmers' Interest in Road Improvement," and F. N. Godfrey, master of the New York Grange, will tell of the work being done by the members of his organization and the good roads legislation in his State.

The National Grange, in conformity with the resolution adopted at its annual meeting a year ago to the effect that the Grange favors the general policy of good roads construction by the various municipalities, counties, and States, and that it also advocates the enactment of legislation by Congress making Federal appropriation for the improvement of highways, is lending its enthusiastic support to the bill recently introduced in Congress by the Hon. Frank D. Currier, of New Hampshire, providing for the creation of a National highways commission. The bill has been endorsed by the various State granges throughout the country, showing clearly the increasing interest of the farmers in good roads, and the realization of their benefits.

"The farmers recognize the need for better roads, and realize how largely such roads would contribute to their comfort and prosperity," said National Grange Master Bachelder in a recent address. "They are anxious that well considered plans for road improvement should be submitted to the State and National legislatures, and will do all in their power to aid in securing the adoption of such plans. They have made up their minds that Congress must devote a share of the annual appropriations to the construction and maintenance of our roads. National aid will not lessen local road activity. On the contrary, the roads constructed with Federal assistance will serve to stimulate everywhere the desire for better roads, and will be the means ultimately of giving the entire country a uniform system of scientifically constructed public highways."

The order of the Grange, or Patrons of Husbandry, was founded 42 years ago, and now has affiliated branches in 28 States, with a total membership of one million. The unit of the order is the local grange composed of the farmers of one community. The National Grange is the national organization composed of the masters of the State granges, each State having equal representation. The farmers of the country were virtually the first road-makers, and in many localities the work of maintaining the roads is still in their hands. One of the big features in the grange movement for good roads is the proposition for the construction by the New England States of trunk lines of highways. This subject was recently presented before the New England State governors by the State Highway Commissioner of Connecticut, James H. MacDonald, and as a result of the favorable action taken at that time plans are now under way to present the matter in a proper form before the State legislatures.

A. M. C. M. A. COMMITTEES MAKE PLANS

NEW YORK, Sept. 13—Decorative plans for transforming the Grand Central Palace into a French trellis garden were approved at the meeting of the Committee of Management last week. Inasmuch as the show this year will be the only international one it is expected to be of greater importance than ever, and the show committee, consisting of R. E. Olds, chairman; S. H. Mora, H. O. Smith, D. J. Post, and Benjamin Briscoe, is bending every effort to make it so. The exhibition will take the place of the Paris Salon, which will not be held until the fall of 1910.

In addition to considering the show plans, the committee transacted much other business of importance. S. H. Mora chairman of the membership committee, reported that four new concerns have been admitted to membership, and a number of applications will be considered at the next meeting. Charles Lewis, president of the Jackson Automobile Company, has been appointed the representative of the A. M. C. M. A. at the good roads convention of the A. A. A., to be held at Cleveland. Plans for an exposition in Berlin, Germany, of American goods were discussed, for the promoters have set aside 10,000 square feet of floor space for American automobiles and the interests of the members of the association have been placed with the show committee. The dates set are for next May, June and July.

Those present at the meeting were: H. O. Smith, Premier, chairman; C. G. Stoddard, Stoddard-Dayton, vice-chairman; S. H. Mora, Mora, treasurer; James W. Gilson, Mitchell, secretary pro tem.; W. H. VanDervoort, Moline, auditor; Benjamin Briscoe, Maxwell; R. E. Olds, Reo; Charles Lewis, Jackson; W. C. Marmon, Marmon; D. J. Post, Veeder Manufacturing Company, and Alfred Reeves, general manager.

NEW FACTORY FOR FIRESTONE COMPANY

AKRON, O., Sept. 13—On a tract of ground in this city, 15 acres in extent, will soon be erected one of the largest and most complete tire factories in the world. It will be built by the Firestone Tire & Rubber Company, which has outgrown its present plant and will make it the largest concern in the world producing only rubber tires. The erection of the new buildings will show the rapid expansion of the company, for it is comparatively young in this industry. It was founded in 1900 by H. S. Firestone, but it was not until the fall of 1902 that Firestone tires were produced in a factory of their own, and that a small one-story structure in which were employed 20 men. As the product became better known the building had to be enlarged, until at present the firm occupies an immense four-story factory equipped with the best machinery obtainable, and employing 600 men. Even this has become insufficient, however, and the new plant is to be the result. Both pneumatic tires and solid ones will be manufactured as in the past, and the output will be far greater than that of any time heretofore.

ANNOUNCEMENT OF 1910 ALCO MODELS

PROVIDENCE, R. I., Sept. 7—The 1910 Alco models have just been announced by the American Locomotive Company, and both the cars and their prices show noticeable changes. The Alco has now definitely abandoned the chain drive for its own system of shaft drive, in which the load-supporting member of the rear axle is a solid drop-forging. This drive has been thoroughly tested in the Alco town cars and taxicabs, in which it has been always used, and its adoption in the larger models is in no way remarkable. Another important change is the adoption of the Bosch dual system of high-tension ignition, which includes a storage battery with the magneto, although both work on the same set of plugs. The use of the battery enables the motor to be started on the spark. With these changes goes a considerable reduction of prices. Last year's three models will be continued in general in this year's 22-horsepower town car, 40-horsepower four-cylinder and 60-horsepower six-cylinder.

CHANGES IN ATLANTA TRADE CIRCLES

ATLANTA, GA., Sept. 13—The automobile map of this city has received some great changes within the last few days, through the establishment of new agencies, the moving of old ones, and the opening of new buildings. One of the most important was the formation of the Corker Motor Car Company, with the following officers: President, S. A. Corker; secretary and treasurer, E. H. Ellerby; manager of city sales, C. H. Alexander; manager of out-of-town sales, M. Z. L. Fuller, recently of the Haynes Company. The company will handle the Haynes cars for the States of Georgia, Florida, Alabama, Tennessee, North and South Carolina, and the Matheson car for this State. A commercial line will probably be added as soon as a garage can be obtained or built.

Winton cars will soon make their début to Atlanta in the handsomest show rooms for automobiles in the city. Herman Haas, the new agent, has secured one of the stores in the new Masonic Temple, where he is spending considerable money for fittings and furnishings. J. S. Goldsmith has taken the agency for the Speedwell cars, having closed a contract through S. E. Edsall, of the Speedwell factory. A location has not as yet been secured. The new Olds-Oakland Company will in a few days move to its new show rooms at 132 Peachtree street, and will have a special garage built shortly.

The new Murphy building has given space for two concerns, one the Steinhauer & Wight Company, handling the Packard, Pope-Hartford, and Cadillac; and the other, J. E. Levi & Co., the new agent for the Reo and Premier. Each concern will have two stores combined and will take possession shortly.

BUFFALO'S AUTO TRADE ACTIVITIES

BUFFALO, Sept. 13—The taxicab business is making great progress. Up to the present time the E. R. Thomas Motor Company has delivered, all told, 1,942 taxicabs, and has under way some 700 of this type, with a demand quite in excess of the output.

The Pierce-Arrow Motor Car Company is fast completing preparation for the prompt delivery of 1,500 cars during the delivery season for 1910. About 1,500 men are in full swing.

The Allyne Brass Foundry Company reports deliveries from the Buffalo branch of more than a carload a week of aluminum, brass and bronze castings, mostly used in automobile work.

The Crosby Company, at its large plant, is delivering vast quantities of drawn and pressed steel to the automobile trade in the shape of hubs, covers, brake-drums, body irons, etc. The process used by the company permits the use of fine grades of steel, induces lightness with strength of parts, and from the point of view of delivery there is no process that is more conducive of results.

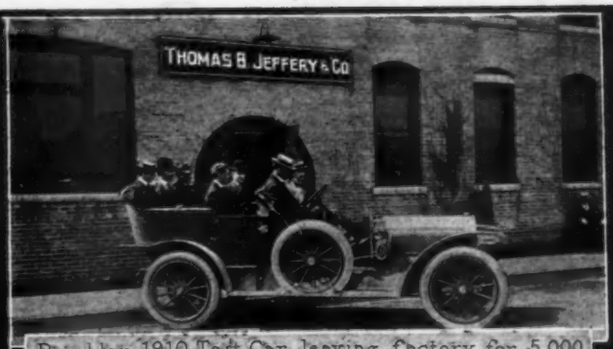
ONE BY ONE HORSE-CABS DISAPPEAR

BALTIMORE, Sept. 13—Taxicabs are fast taking the place of horse-drawn cabs in this city. The latest convert is Harry L. Stewart, who has turned his stables into a garage for taxicabs. Next week he will begin a taxicab service which will represent an investment of $80,000. As a starter 25 Alco machines will be put in commission, with more to follow if they are found necessary. The cars will have blue bodies with red wheels, and the taximeters will be driven from the front axles.

METEOR FACTORY IN CONFLAGRATION

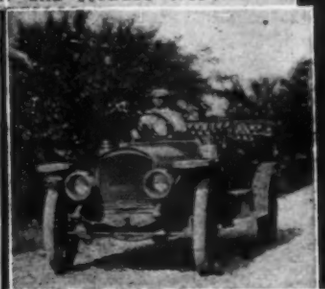
DAVENPORT, IA., Sept. 10—The Meteor Car Company had a disastrous fire last night which completely destroyed its entire factory, with the exception of the office building. With the latter, however, were saved all drawings, patterns, jigs, special tools, etc., and, in fact, all necessary working material for the 1910 models. The company cannot determine how long it will be before operations are resumed, but will do everything in its power to get under way again in record time.

Rambler Eastern 1910 Test Car leaves factory — driven by G.S. Patterson of Cleveland Branch



Rambler 1910 Test Car leaving factory for 5,000 mile test trip to South and Middle West

Rambler Eastern Test Car reaches Frazier's Garage South Bend, Ind.



Prince Wells, Louisville agent driving 1910 Rambler Test Car

UNIQUE BUT THOROUGH ROAD TEST

KENOSHA, WIS., Sept. 13—One of the most unique methods of testing a car was pursued in the try-out of the 1910 models of Thomas B. Jeffery & Company, makers of the Rambler. The method had all of the advantages of a factory or expert test, and in addition the merit of making the various agents familiar with the new car in advance of the time, which would otherwise be the case. It consisted of sending out two of the newest additions to the Rambler family, one to the East, and the other to the South and West. These were manned by drivers from the various agencies, each crew driving on to another agency, and there turning the car over to the crew selected by the manager there. In most cases, the picked crew consisted of the manager himself.

Included in the itinerary of the eastern car were Cleveland, Toledo, Pittsburgh, Harrisburg, Philadelphia, New York, Boston, Albany, Buffalo, and back to the factory through Cleveland, Toledo and Chicago. The car traversing the West went from the factory to Chicago, South Bend, Indianapolis, Louisville, Nashville, St. Louis, Kansas City, Omaha, and thence back to the factory through Chicago, in charge of J. T. Stewart, of the Coit Automobile Company of Omaha. Not only did this method of testing the car put it up against every kind of road conditions, as, for instance, an impassable mud-hole in Kansas, which delayed it for 13 hours, but a wide experience in driving on the part of the various dealers was assured. The details of the car will be announced later on. Both cars returned to the factory in perfect condition, but it was thought wise to defer the announcement of the details until all of the agents who had driven the cars had written in and reported their widely differing experiences with the test cars.

Rambler 1910 Eastern Test Car at Toledo.

Rambler 1910 Test Car reaches Chicago in charge of J.T. Stewart

1910 Test Car at Rambler Headquarters, Cleveland

Kingman St. Louis Implement Co take charge Test Car for trip to Kansas City

Manager Rockwell of Boston Branch receives Rambler Test Car at New York and drives it to Hartford, Conn.

E.G. Anderson of Rambler Auto Co. Kansas City driving Test Car from Kansas City to Omaha

NEWS IN GENERAL

A Party of Franklin Travelers on a Tryout of 1910 Franklin Automobiles
Photograph taken on top of Mt. Taupin, New York

Sample of Franklin Testing—On one of the recent test runs which the H. H. Franklin Manufacturing Company, of Syracuse, N. Y., is daily giving to its dealers to show the Franklin 1910 automobiles under severe road conditions there were men representing automobile interests from the Atlantic to the Pacific. In the party was H. J. Banta, Spokane, Wash.; H. R. Grant, Seattle, Wash.; J. D. Moore, Boise City, Idaho; W. S. Jewell, New York City; Robert LaPorte, Philadelphia, and Capt. Barker, of the United States Army, located at Fort Leavenworth.

The trip was down the Onondaga valley from Syracuse to Cardiff, one of the steepest hills in New York State, and about a mile in length, to Lafayette, along the ridge overlooking Onondaga valley to Tully, from Tully to Preble, where a climb up Mt. Taupin, a very steep ascent of 1,000 feet, was made. From this point the route turned to the east and went over a succession of hills varying in length and steepness, all of which were exceedingly rough and rugged until the valley of Sherburne was reached.

From there the course turned to Utica, from which point a return run was made to Syracuse. One of the cars on the trip, a 1910 six-cylinder model, here started on a record run to Syracuse, a distance of 55 miles, which it covered with its load of seven passengers in 1 hour 15 minutes, which is equal to the running time of the Fast Mail, and but ten minutes slower than the Empire State Express.

The whole demonstration was planned with the idea of putting the 1910 machines over a very severe course in order to demonstrate to the Western dealers that the cooling properties of the 1910 Franklin were beyond question of doubt.

Remy Company Plans More Branches—Owing to the great western demand for Remy magnetos the Remy Electric Company, of Anderson, Ind., manufacturer of the Remy mechanical ignition systems, has completed plans for the establishment of branch selling offices at Kansas City and San Francisco. Although locations have not been secured at this time, it is expected that a corps of experts will be in the two western marts by January 1, 1910. Edward F. Willett, who has been connected with the New York selling office, will be put in charge at San Francisco, and Ross E. Luellen will be sent from the factory to manage the Kansas City offices. These men will be assisted by experts from the factory. The expansion of the Remy Company during the season of 1909 has been marked by the establishment of branch selling offices in Chicago, New York, and Detroit, and the addition of twelve new fire-proof buildings to the factory. The increased facilities for manufacture and distribution, however, will be needed for 1910, as 80,000 Remy high-tension magnetos have been sold to automobile manufacturers on minimum specified delivery, and contracts are still being received.

Klaxon Makers Enter European Fields—The Lovell-McConnell Manufacturing Company, the maker of the famous Klaxon horns, has arranged to sell its horns in Europe as well as all over this country. With foreign patent rights it has established the Klaxon Company, Limited, with its head office at 41 Rue de Berlin, Paris, and with selling branches in London, Berlin, Brussels, and Milan. A gold-plated Klaxon has been shipped from the Newark factory to the foreign representative to be given to the Queen of England. The business in the United States has assumed enormous proportions and is constantly increasing, both for automobiles and motor boats. Miller Reese Hutchinson is also the inventor of the Acousticon for the deaf, and a few years ago spent some weeks in London and restored the Queen's hearing to 90 per cent of its normal by his application.

English Firm Gets Timken Rights—The Timken Roller Bearing Company, of Canton, O., has made arrangements with the Electric & Ordnance Accessories Company of Birmingham, England, to manufacture roller bearings in that country for foreign trade. The Birmingham firm is controlled by Vickers' Sons & Maxim, Ltd., of London, one of the largest English commercial concerns. By this means the Timken products will be furnished to the automobile trade of Great Britain and the countries on the continent. There are few bearings of this type made in Europe, and it is expected that the American ones will meet a large field. The builders of the Wolseley cars have adopted them after exhaustive tests upon the roads.

Watch the Wheels—The experts of the Fisk Rubber Company have found that a great deal of tire trouble is occasioned by the fact that the wheels of the automobiles are not lined up properly. Frequently when the wheels strike curbs or other obstructions the axles or knuckles are slightly bent, and inasmuch as this is not particularly noticeable, the owners do not have the trouble remedied. Tires in such instances wear out with astonishing rapidity, and the Fisk men now make certain that the wheels are true before putting on the tires. When the tires are on wheels which toe in or out the stress falls to one side of the tread instead of on its center, and autoists are warned to look out for this.

Moline Factory Enlargement—Following the most successful season in its history, the Moline Automobile Company, East Moline, Ill., has just awarded a contract for the construction of another factory building. It will be 100 by 125 feet in size, with four stories, thereby increasing the floor space of the present plant by 50,000 square feet. Chassis and body assembling will occupy most of the extra room, and some will be utilized as a warehouse. The excellent showing made by the three Molines in the Glidden tour for the Hower trophy has created a widespread demand for Moline agencies, and the enlargement is the result of the increased business.

New Departure-Bristol Merger—According to President Rockwell of the New Departure Company, of Bristol, Conn., who is also president of the Bristol Engineering Company, these two companies will be merged as soon as the necessary formalities can be complied with. This action meets with the unanimous approval of the stockholders of both companies. It has been persistently rumored that the Bristol Engineering Company, which employs 200 men, was seeking another location because of lack of room, but the merger is expected to provide sufficient accommodations.

American Oil Company Doubles Capacity—At a recent meeting of the board of directors of the American Oil Company, of Jackson, Mich., it was agreed to double the capacity of the works, and to build a two-story brick office. These changes are to accommodate the growing trade in the American automobile oils, greases, and soap. An increase of 100 per cent was made during the year, and it is steadily becoming larger. The company now has branches in Chicago, Detroit, Saginaw, and Kalamazoo, and distributing agencies in Omaha and St. Louis.

Pierce and Thomas Teams in Base Ball Series—The question of base ball supremacy of the Pierce-Arrow and Thomas automobile plants in Buffalo has been a warm one during the season, and on Labor Day and the preceding Saturday the two came together. The Pierce-Arrowites won both games, the

first by a score of 15 to 1 and the second with the tally 10 to 2. Now the Pierce men want to arrange a series with the Buffalo club of the Eastern League as soon as the latter's regular season is over, to determine the championship of the city.

Hokanson Agency Reorganizes—The Hokanson Automobile Company, of Madison, Wis., has reorganized under the same name, increasing its capital stock from $40,000 to $70,000. C. F. Spooner is now president, Emil Hokanson, vice-president, G. P. Miller, secretary, and Rudolph Hokanson treasurer and manager. The company plans to extend its system of branch garages and agencies through western and southern Wisconsin, and will also take up the manufacture of tops and other accessories.

Pope Mfg. Co.'s Additional Plant—The Pope Mfg. Co., of Hartford, Conn., has virtually acquired the plant formerly known as the Pope tube mills, situated just south of the Hartford Rubber Company's factory. During the old bicycle days this was one of the busiest factories in town, but it has now been for a long time unoccupied. The Capital avenue works of the Pope Mfg. Co. now employ nearly one thousand men, and it was deemed a matter of economy to acquire another building for the overflow.

Owen Thomas Stockholders Meet—The meeting of stockholders and directors of the Owen Thomas Motor Car Company, of Janesville, Wis., scheduled to be held in Chicago, September 7, to choose a location for the proposed plant of the company, has been postponed. However, it is believed certain that the plant will be in Janesville. Two Owen Thomas "Sixes" are already on the road.

Mitchell Works Three Shifts—A rush of orders for the 1910 models from all parts of the country has made it necessary for the Mitchell Motor Car Company, of Racine, Wis., to adopt the 24-hour day, and beginning this week three eight-hour shifts will be employed for at least three months. The company has already 900 men on its payroll.

IN AND ABOUT THE AGENCIES

Selden in Several Cities—Selden cars will be sold more widely during the coming season than ever before and agencies are being established in many important automobile centers. The Selden Car Company of Georgia will occupy a new and handsome garage building in Atlanta on November 1. It is located on Carnegie Way, opposite the Orpheum Theater and near the Piedmont Hotel. A five-year lease has been obtained. At San Antonio, Tex., the Selden will be represented by the A. E. Staacke Automobile Company. One of the most attractive stores now in Boston's automobile business has recently been opened by the Selden Motor Car Company of Massachusetts, at 801 Boylston street. The Selden Car Company of Pennsylvania was recently incorporated, and is located at 336-338 North Broad street. Louis Caswell, formerly sales manager of the Selden Motor Vehicle Company, is identified with the Quaker City business and expects to give it his personal attention.

Speedwell Agencies—The Speedwell Motor Car Company, of Dayton, O., has announced the following agencies for the coming year: Henry Dryfoos, Jr., Hazleton, Pa.; H. F. Van Cleave, 4209 Morgan street, St. Louis; Motor Car Sales Company (George W. Graham), San Antonio, Tex.; J. W. Goldsmith, Jr., & Company, 790 Peachtree street, Atlanta, Ga.; Budd M. Robinson, Joplin, Mo.; Hollis-Rand Company, Rochester, N. Y.; Thompson-Cuthbert Company, Portland, Ore.; Newbold Speedwell Company, Evening Star Bldg., Washington, D. C.

Pullman, Philadelphia—The Longstreth Motor Car Company, located at 1407 Race street, will handle the Pullman in the Quaker City and vicinity. The company will move shortly into new quarters, now in preparation, at 257 North Broad street.

Continental Tires, Nebraska—The Continental Caoutchouc Company, of New York, has delegated the agency for the state of Nebraska to the Western Automobile Supply Company, 1920 Farnum street, Omaha, Neb.

PERSONAL TRADE MENTION

Lewis H. Van Cleft, well known to automobilists as the steward of the Hotel Cadillac, New York, has recently opened his own café in the Gainsborough studio building at 222 West Fifty-ninth street. This is just off Columbus Circle and in the midst of the automobile district. On last Thursday evening Mr. Van Cleft entertained a number of the New York automobile writers and trade at a dinner to mark the opening of his season.

J. D. Cary, who has traveled for the past year in the South representing the B. F. Goodrich Company of Akron, has severed his connection with that concern to enter the employ of the Federal Rubber Company of Milwaukee, Wis. Mr. Cary will have full charge of this company's interests in the South among the automobile and carriage trade.

W. McKean White has become one of the chief aides to Alfred Reeves, general manager of the A. M. C. M. A., in the conduct of the Grand Central Palace show. Mr. White until recently was connected with THE AUTOMOBILE's editorial department, previous to which he was automobile editor of the Philadelphia *Times*.

Harry A. Mayer, of Baltimore, has joined the sales force of the Auto Supply Company, 208 West Saratoga street. He has been until recently with the James G. B. Davy & Company Supply House.

William L. Scribner, formerly of the E. R. Thomas Motor Company of Buffalo, has joined the engineering department of the R. L. Morgan Company, at Worcester, Mass.

OBITUARY

Charles E. Brown, vice-president and treasurer of the Shortsville Wheel Company, of Shortsville, N. Y., died on August 28.

FIRESTONE COMPANY ELECTION

AKRON, O., Sept. 13—At the regular meeting of the Firestone Tire & Rubber Company the following officers were elected: President and general manager, H. S. Firestone; vice-president, Will Christy; secretary, S. G. Carkhuff; treasurer, L. E. Sisler. The annual report showed an increase in sales of about 50 per cent. over the previous fiscal year, and in order to keep pace with the demands the concern is about to erect an immense plant.

HERCULES COMPANY ENLARGES

INDIANAPOLIS, Sept. 13—The Hercules Electric Company, of this city, has started its third factory enlargement since January 1, and is negotiating for the purchase of additional ground for further operations. This is caused principally by a new arrangement with Roger B. McMullen, of Chicago, by which he will hereafter handle the sale of the Kurtz high tension magnetos made by the local concern, in addition to his other automobile accessories. The size of his order was such as to require an immediate increase in the size of the plant, in order that deliveries may be made according to promises. With the prospective enlargements this will be assured. The Hercules Company cites this as another instance of the steadily increasing popularity of magneto ignition.

HARROUN BUMPER PATENT UPHELD

CHICAGO, Sept. 11—The Turner Brass Works of this city has had sustained the Harroun patent under which its bumpers are manufactured. Fifteen days after the filing of the suit against the Vanguard Mfg. Co. for alleged infringement, Judge Sanborn of the Circuit Court granted a preliminary injunction restraining that company from manufacturing, selling or using bumpers infringing on that patent during the pendency of the suit in question. The Turner Company has at present nine suits under way and means to fight each one. Any further infringements may result in other suits.

OLDFIELD HOLDS REMY BRASSARD

Barney Oldfield is now the possessor of the Remy brassard, the trophy offered the victor in the 25-mile free-for-all at Indianapolis. The fact that the handsomely wrought silver shield bears with it a cash reward of $75 each week makes it doubly precious to the great driver. The value of the trophy naturally produced a keen struggle. De Palma finished second in his Fiat, and Zengel was third in the Chadwick. Oldfield's time for the 25 miles was 21:21.7. The trophy will be raced for again at the September meet at the Speedway.

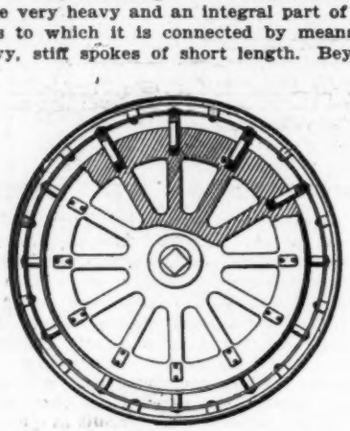
Remy Brassard Now Held by Oldfield

SOME SELECTED AUTOMOBILE PATENTS

Issue of August 17, 1909

931,048. Spring-Wheel—Ludwig Flum, Chicago. Filed June 26, 1908.

Interest in spring wheels and other methods of putting the tire manufacturers out of business, continues unchanged either in quantity of inventors and inventions or quality of the same. Flum's idea is to have a multiple felloe, three being shown in the patent office drawing. Of these, one seems to be very heavy and an integral part of the hubs to which it is connected by means of heavy, stiff spokes of short length. Beyond

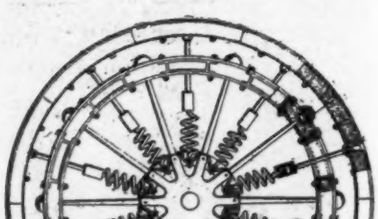


Flum's Spring Wheel Has Three Felloes

this, and attached to it by means of small diameter pistons, which are free to slide up and down, is the second felloe. This appears to be of very light spring steel construction, and carries on its outer side the true felloe to which the tire, or substitute for a tire, is fixed by short lugs. The construction seems to be, like many others of its kind, lacking in side strength.

931,214. Vehicle Wheel—Barrett C. Oblinger, Independence, Mo. Filed April 3, 1908.

Like Flum, Oblinger shows a partiality toward the multiple felloe, but uses only two. One, the inner, is firm and unyieldingly attached to the hubs by spokes of the usual variety, the ends of which project through the felloe and are capped with rubber buffers on the extension. This felloe is of a built-up construction, which is doubtless intended to yield some slight give or spring. The other or outer felloe is attached to a second series of spokes, one being placed between each two of the first-mentioned spokes. The secondary spokes have spring ends at the inner or hub ends, the attachment being a spiral spring connected to a spring steel plate. Like others, this would

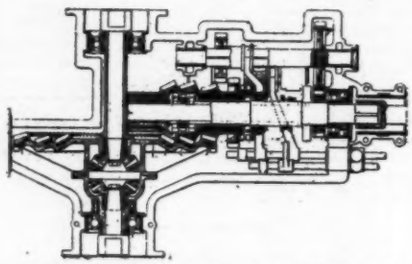


Oblinger Uses Spring Spokes Instead

have little lateral strength, while with the usual number of spokes, there would be little elasticity, since the rim is divided into half as many segments as there are spokes, resulting in each segment being large. It would therefore be either too stiff or too weak. It is difficult to see how freedom of movement could be combined with rigidity for driving.

931,288. Change Speed Gear—Powell Evans, Philadelphia. Filed March 6, 1907.

This is the well-known Evans transmission, which has been manufactured and marketed almost since the filing of the claim over two years ago. The principal feature of it is the number of direct drives which may be obtained as compared with others which yield but one direct drive on

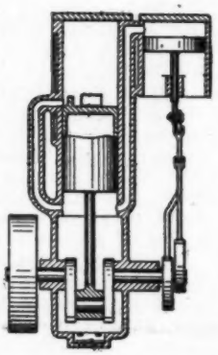


Change Gear Gives Direct on All Speeds

the high gear. With this form three differing drives are direct, this result being obtained by the use of three sets of bevel gears and pinions. All of these are driven from the engine and may be put into service at will by the use of the jawed clutch with which each is equipped. A single additional sliding gear gives all other speeds and the reverse.

931,346. Internal Combustion Engine—Erik A. Rundlof, Stocksund, Sweden. Filed Aug. 28, 1908.

Two cycle engines, like spring wheels, never fail to interest the inventors. This one differs only in that a separate chamber is provided for the compression of air or fuel as the case may be. This then passes into the crankcase, and thence through the transfer port into the cylinder. One point missed by the inventor is that the extra power absorbed by this separate compression chamber would wipe out all margin of present advantage over the four cycle, if any such actually exists.



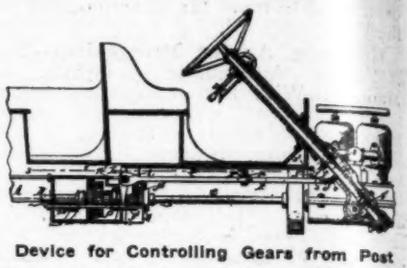
Rundlof Two-Cycle Engine

Issue of August 24, 1909.

931,770. Controlling Device for Change-Gears—Albert F. Krause, Buffalo, N. Y. Filed April 10, 1908.

The gear-change lever on the steering post so popular a number of years ago was abandoned primarily because it did not admit, with the construction in use at that time, the operation of a selective type of change-gear. In the opinion of designers, the selective change-gear had more weighty advantages than the steering-post control lever, and so the latter, other reasons aside, was dropped. At present it is almost entirely out of use.

Mr. Krause's invention is intended to reinstate this type of control in its former popularity by providing means for its use in connection with the now universal selective gears. The lever on the post has a movement in two planes, the usual swinging motion parallel to that of the steering wheel, and another up and down, which are imparted to a sleeve surrounding the steering column, the sleeve either revolving or sliding longitudinally. In the diagrammatic drawing shown, the sidewise motion of the



Device for Controlling Gears from Post

lever is used to select the desired sliding member, and the upward and downward motion to mesh its gears with those of the lay shaft.

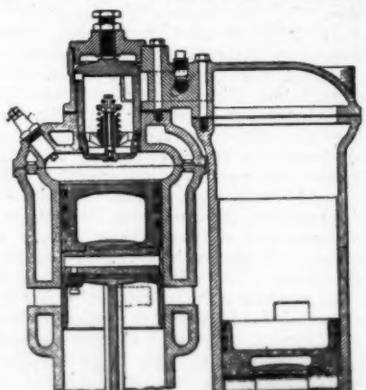
931,879. Automobile Tire—Charles E. La Fleur, Philadelphia, Pa. Filed Sept. 13, 1907.

This tire is of the usual construction in so far as it is built up of a woven carcase, a cushion of resilient rubber, a breaker strip of fabric and a rubber tread. However, the tread is made rather thicker than usual, and has a deep circumferential groove hollowed out of it, nearly reaching in to the breaker strip. A special tread is inserted in this groove, composed of fabric embedded in rubber, very tough and of small elasticity, in which the numerous layers of fabric are vertical when the tire is in position on the wheel, so that the ends of the fibers of the fabric may be brought to the surface to take the wear. The material of which this fabric is to be made is not specified; however, the tire should in any case be practically puncture-proof as long as the fabric layer remains of good thickness.

Vertical Fabric Prevents Punctures

931,837. Internal-Combustion Engine—Harry W. Beach, Montrose, Pa. Filed March 22, 1905.

This invention relates to a form of two-cycle motor in which the incoming charge enters through a valve in the cylinder head. The construction, as shown in the drawing, includes a separate pumping cylinder; al-

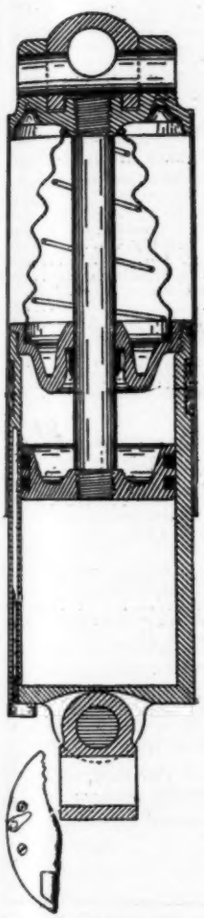


Beach Two-Cycle with Pumping Cylinder

though presumably crankcase compression could be used, this would involve a long passage up the length of the cylinder, which would be undesirable for many reasons.

Information for Auto Users

The Kilgore Shock Absorber—This device has been on the market and in practical use for the last five years and, like everything else in the automobile line, has been improved from year to year. It is now considered a standard article by the automobiling public. The Kilgore Mfg. Co., of 585 Boylston street, Boston, composed of prominent Boston capitalists, equipped a thoroughly up-to-date factory and commenced delivery of the improved shock absorber in January, 1909. Since that time it has been necessary to add to the factory and to run considerable overtime.



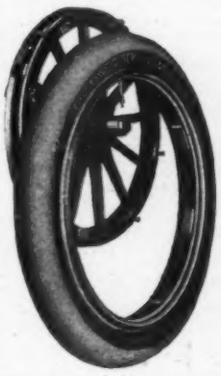
PLAN OF KILGORE SHOCK ABSORBER

The cut shows a cross section of the device. It consists primarily of a cylinder attached to the axle of the car and a piston attached to the frame. The principle is similar to that of the pneumatic door-check to prevent slamming. The cylinder is double-acting, so that either an upward or a downward movement of the piston compresses the air and acts to check the motion. A small air passage is drilled in the wall of the cylinder, allowing the air to pass slowly from one side of the piston to the other. If the piston makes a sudden jerk, however, this passage cannot accommodate the air fast enough to keep pace with the movement, and a damping influence is at once exerted. If the piston travels too far in either direction it covers up the opening in this passage, and the remaining air is compressed until the movement is totally checked.

The passage has a valve which may be adjusted to regulate the size of the opening as desired. Once set, this need not be changed. No resistance is offered to the normal action of the springs, but a sudden or violent movement is at once checked.

The shock absorber is constructed in the best manner throughout. The cylinder and piston are made of bronze, accurately bored and turned; the latter is fitted with two rings. The cylinder head screws in and has a packing gland to prevent air leakage around the piston rod. The upper end of the rod has a cap which carries a universal joint, connected in turn to the frame. From this cap a telescoping tube of seamless brass extends down over the cylinder to make the construction mud-proof. The lower end of the cylinder is made fast to the axle also through the medium of a universal joint, so that the device cannot be wrenched or strained by any movement of the car.

Firestone Demountable Rims—The new Firestone demountable rim is adaptable to any quick detachable tire, as well as to the regular clincher. Stay bolts are thus abolished and the security and time-saving features of the quick detachable rim are secured. This advantage can only be appreciated fully by the user of clincher demountable rims who has once attempted the extremely difficult operation of removing and refitting a regular clincher tire, with its short-stem stay-bolts, on the spare detached clincher rim. That weakness makes such rims a positive disadvantage, after the spare tire has once been used. There is also the possibility of more than one puncture occurring on the same trip. With the new type of rim, the user has one change immediately available through the spare tire, and, if necessary, can make additional changes with all the ease inherent in the detachable type of rim.



THE NEW FIRESTONE DEMOUNTABLE

The Firestone type of demountable rim is held in place by a ring of triangular cross section, in turn retained by eight bolts passing through the felloe of the wheel. The parts are so designed that they cannot stick from rust or accumulations of dirt. All angles of contact are so blunt that wedging of parts is impossible. There are no thin, narrow, wedge shapes, no complicated parts. No special tool is required. The entire operation is so simple and easy that there is no temptation to try it the wrong way. The demountable rims are adaptable to all quick detachable and clincher tires, and may be fitted without changing the present tire equipment in any way on practically any car, new or old.

"Apco" Crankcase Oil Gauge—The Auto Parts Company, of Providence, R. I., is making an oil gauge specially adapted to use on the crankcases of Ford models N, R, S and T. It is a small, simple device, readily applied with the assistance of a pair of pliers in ten minutes. Its use obviates the necessity of stooping down to try the oil with the cock; instead, the amount in the case is immediately indicated at a glance. The maker points out that oil costs money, and too much oil is not only wasteful, but also likely to cause sooted plugs and excessive carbon deposits in the cylinders, in addition to making the car a nuisance by giving out clouds of pungent blue smoke. The gauge is furnished with attachments for any Ford car. The company also makes a tool for redressing and cleaning the threads of tire valves, which looks as though it might give good service on occasions which frequently are all too familiar to the automobilist.

APCO OIL GAUGE FOR CRANKCASES

"Tray Plate" Storage Batteries—The Tray Plate Battery Co., of Binghamton, N. Y., has just moved into a new factory which will enable it to produce its "High Efficiency" batteries on a larger scale than heretofore. This company's batteries show a neat and workmanlike design, and their 6-volt, 60-ampere size used for automobile ignition is averaging 1200 to 1500 miles per discharge, according to the vibrator adjustment. These batteries have only recently been put on the market, after a three years' practical road test had eliminated every weak point which could be found.

The grid used is of the "checkered" type, which not only gives a greater capacity per square inch of plate surface, but also makes a plate of exceptional strength and durability, calculated to withstand the hard usage to which batteries in automobile service are constantly subjected. By a special process, the active material in the plates is made exceptionally hard and porous and the tendency to sulphate is materially diminished. Only rubber separators are used in the construction.

"HIGH EFFICIENCY" STORAGE BATTERY

The battery illustrated herewith weighs 27 pounds; its dimensions are 6 1-2 by 6 3-4 by 8 1-2 inches in height. This company also makes batteries especially designed for use in electric lighting systems, obviating the difficulties of gas generators and tanks. It has published a booklet on the relative cost of different ignition systems which, together with catalog No. 109, will be gladly mailed on application.

This company's line of batteries built for high rates of discharge are also worthy of attention among autoists who are contemplating the equipment of their cars with electric lighting systems.

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